



Consulting

Final Report

AGRI-ENVIRONMENT LEGISLATION, POLICIES AND PROGRAMS IN SELECTED OECD COUNTRIES

Prepared for

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EXECUTIVE SUMMARY	i
PART I	
I INTRODUCTION	1
II IMPACT OF AGRICULTURE AND THE AGRI-FOOD INDUSTRY ON THE ENVIRONMENT	3
A. Environmental issues	4
III CANADA	7
A. Environmental issues	7
B. Overview of policies and programs	10
C. Key programs for air, water and soil	12
D. Biodiversity, nature and landscape	15
E. Key players	17
IV UNITED STATES	19
A. Environment issues	19
B. Overview of environmental policies and programs	20
C. Key programs for air, water and soil	21
D. Biodiversity, nature and landscape	26
E. Key players	26
V EUROPEAN UNION	27
A. Environmental issues in Member States	27
B. Overview of environmental policies, directives and regulations	28
C. Key programs developed by Member States	35
VI NETHERLANDS	39
A. Environmental issues	39
B. Overview of environmental policies and programs	40
C. Key programs for air, water and soil	43
D. Biodiversity, nature and landscape	46
E. Key players	48
VII DENMARK	50
A. Environmental issues	50
B. Overview of environmental policies and programs	51
C. Key programs for air, water and soil	53
D. Biodiversity, nature and landscape	55
E. Key Players	56
VIII FRANCE	58
A. Environmental issues	58
B. Overview of environmental policies and programs	59
C. Key programs for air, water and soil	61
D. Biodiversity, nature and landscape	62

IX AUSTRALIA	63
A. Environmental issues	63
B. Overview of policies and programs	66
C. Key programs for air, water and soil	69
D. Biodiversity	75
E. Key players	78
X PROVINCES AND STATES	80
A. Quebec	80
B. Iowa	86
PART 2	
XI APPLICABILITY ASSESSMENT	100
A. Introduction	100
B. The approach	101
C. The assessment	101
PART 3	
XII SECTORAL ASSESSMENT	111
A. Overview and approach	111
B. Relevant factors	111
C. Step 1 - hog and field crop production	113
D. Step 2 - Quebec And Iowa hog production	125
PART 4	
XIII FINDINGS AND SUGGESTED FURTHER RESEARCH	127
A. Findings	127
B. Suggested future research	128
Appendix A	
Program expenditure	
Appendix B	
Legislation by country	
Appendix C	
Hog and field crop statistics	
Appendix D	
References	

Executive Summary

This report represents a compilation of work focused on agri-environmental policies and programs in selected countries within the Organization for Economic Co-operation and Development (OECD). The report consists of two volumes, the first containing four parts and the second containing the appendix, which consists of technical support information, including expenditure summaries for various countries. The first volume covers a broad spectrum of issues, ranging from a review of key environmental policies and programs in various countries and their applicability to Canada, to the potential impact of agri-environmental programs on producers, findings, and suggestions for further research.

Part 1 is the single largest segment within the two volumes and focuses on national policies and programs specific to air quality, water quality, soil conservation and biodiversity. For the European countries and European Union (EU) Member countries, policies and programs targeting the conservation of nature and landscape were also reviewed. The complexity of agri-environmental regulations below the national level is revealed in a review of selected policies and programs in the province of Quebec and the state of Iowa. In general, European countries have faced environmental challenges for a longer period than Canada, the United States (US) and Australia. However, regardless of history and the length of time certain problems have existed, there are similar issues and challenges in all countries. As detailed, the agricultural industry and certain programs can produce direct and indirect environmental benefits (e.g. nutrient resources and land management systems), and it can also contribute to environmental problems through the production of greenhouse gas emissions, reduced water quality due to nitrate and phosphorous contamination, soil degradation, and a reduction in biodiversity, through degradation or modification of the air, water and soil.

The overview provided in Part 1 illustrates the broad range of policies and programs that have been implemented in the countries reviewed. The range of policies and programs reviewed within the report can be illustrated through a brief comparison of Canada, the US and the European Union. In terms of Canada, concern for agri-environmental issues started in the 1930s and today, federal and provincial governments share the responsibility for agri-environmental issues. In response to Canada's new environmental agenda in 1997 (A Guide to Green Government), the department of Agriculture and Agri-food Canada developed the strategy entitled "Agriculture in Harmony with Nature: Strategy for Environmentally Sustainable Agriculture and Agri-Food", which provides a framework for integrating sustainable environmental considerations into policies and programs. In the US, most agricultural environmental policies and programs are introduced and governed by the Federal Agriculture Improvement and Reform Act (commonly known as the FAIR Act or the 1996 Farm Act). Many of the new policies are centered on specific land conservation programs to reduce soil erosion, protect fragile environments and encourage an environmental plan for the farm through cross-compliance of program benefits provided

under the Farm Bill. In terms of Europe, the European Union (EU) is an economic and political organization of 15 countries, and policies and programs are issued as either directives or regulations. The EU does not operate any programs and does not make direct agreements with farmers. Rather, the European Commission, which is responsible for formulating and initiating policy proposals in various areas including agriculture, ensure that the programs approved for joint funding with Member States meet EU environmental objectives and conditions set out in the directives and regulations.

Part 2 of this report builds upon the information in Part 1 and focuses on the applicability of these programs to Canada. The goal of Part 2 was to undertake a qualitative assessment of the various programs and this was summarized in five major observations, related to the following: (1) the national and regional responsibilities for agri-environmental issues vary considerably from country to country, (2) national laws and government structures are major factors affecting applicability of programs between countries, (3) policies and programs are generally developed to solve specific problems and a dynamic approach is required, given that the severity of the problem changes on a regional basis and over time, (4) public awareness has a direct impact on the type of legislation and programs implemented by the various levels of government, and (5) specific developments within the agricultural industry have increased pressure on the environment, and this pressure can be very localized (e.g. intensive livestock production). This section concludes that a number of the national priorities in European countries are regional or localized issues in Canada (e.g. nitrate and phosphate contamination of ground water). However, certain practices such as restricting the timing and quantity of manure application are certainly appropriate and valid. It should be noted that some Canadian provinces have similar programs. In regards to land management and biodiversity, various options do exist and some involve a further integration of environmental stewardship and cross-compliance of programs.

Part 3 examined the potential impact of regulations on hog and field crop producers on a qualitative basis. The quantification of production costs and cost differentials between provinces, states and countries was beyond the scope of this study, given the complex inter-relationship between national (federal) and provincial (state) legislation, policies and programs. Part 3 was completed by first summarizing the major programs and policies that have a direct and indirect impact on producers in the various countries. In addition, specific programs and policies in both the province of Quebec and the state of Iowa were compared. The assessment led to a number of findings involving program complexity, capital costs and annual operating expenses. In general, program complexity and requirements have a direct impact on the establishment and expansion of intensive hog operations, which results in additional investment costs and increased operating expenses. In specific countries such as Denmark and the Netherlands, the requirements are severely restrictive, to the point of limiting the expansion of existing facilities. In general, agri-environmental programs and policies can affect investment plans and costs (e.g. location of facilities and machinery requirements), annual operating costs (e.g. manure disposal practices), and overall production costs (e.g. size limitations and increased operating costs increase unit costs). Therefore, investment decisions must fully account for current and proposed programs and carefully evaluate the options to maximize the benefit from manure resources.

Part 4 contains a number of findings and provides suggestions related to further research work. The findings focus on issues related to policy and program scope, program design, integration, the effect on producers and implementation factors, including monitoring, evaluation and enforcement. The suggestions for future research focuses on national best practices, program design and financial support.

Part 1

Review of Key Agri-Environmental Policies and Programs by Country

1

Introduction

This report focuses on agri-environmental policies and programs in selected OECD countries. In Part 1, key agri-environmental policies and proposals have been summarized for Canada, the United States (US), Denmark, the Netherlands, France and Australia. The European Union (EU) was also examined in terms of its directives and regulations for Member States. Part 2 of this report focuses on the applicability of these programs identified to Canada. Part 3 of this study examines the potential impact of the regulations on hog and field crop producers on a qualitative basis. Part 4 reviews the key findings of the report, and discusses areas where future agri-environmental research could be undertaken.

National policies and programs specific to air quality, water quality, soil conservation, and biodiversity are examined for each of the selected countries in Part 1 of the study. For the European countries and the EU, policies and programs targeting the conservation of nature and landscape were also reviewed, as these regulations can have an impact on agricultural land use and farm practices. In addition, a number of these nature and landscape programs are linked to the conservation of biodiversity.

The complexity of agri-environmental regulations below the national level is revealed in a review of selected policies and programs in the province of Quebec and the state of Iowa. The provincial and state review focuses on regulations specific to the management of mineral nutrients (e.g. nitrate, phosphate).

For the purpose of this project, we have limited our report to major agriculture and agri-food policies and programs directly relevant to the four areas of environmental concern. To provide an overview of the development of environmental regulations, a table summarizing the key policies and programs in chronological order has been included for some countries. Estimates of agri-environment expenditure by countries are included in Appendix A. However, expenditure on agri-environmental programs was not available for all the countries. Details of the individual key policies and some programs are shown in Appendix B. Relevant hog and field crop statistics are included in Appendix C.

Key policies are defined as planning or strategy documents that have resulted in a particular focus or direction for a country. Usually, these documents specify the goals, principles, and guidelines for specific agri-environmental issues. In some countries, these documents include the establishment of specific laws, institutions and programs. An example is the Three Phase Plan in the Netherlands, which introduced the Manure Law and a number of environmental programs.

At the program level, we have concentrated on two types of programs: 1) programs or

directives designed to require specific levels of commitment from the agriculture and agri-food sectors (e.g. reduction of nitrates); and 2) programs that provide assistance to meet regulatory requirements. In one case, we included a government trust fund targeting sustainable environmental development, since specific elements of this fund can be accessed by producers to meet compliance costs.

Policies and programs excluded from this report include:

- programs specific to emergency situations arising from natural disasters (e.g. flood programs);
- programs undertaken by nonprofit organizations and producer groups with national funding;
- provincial or state policies and programs, except for the selected state/province in the US and Canada;
- international conventions and Agreements signed by individual countries (e.g. the Ramsar Convention and the Convention on Biological Diversity); and
- producer marketing organizations (e.g. Australian Wheat Board), supply management organizations (e.g. Canadian Dairy Commission), and government research or regulatory institutions (e.g. Canadian Grain Commission) are excluded unless deemed to have a significant impact on environmental factors.

II

Impact Of Agriculture and the Agri-food Industry On The Environment

There was a general increase in recognition that agriculture and agri-food production have an impact on the environment started in the seventies. Public awareness of this issue increased in the eighties. At the same time, more research was undertaken to gain knowledge on how agricultural and agri-food activities, including government policies and programs, impact the environment.

Throughout the eighties and nineties, producers, processors and governments have been faced with the challenge of balancing environmental concerns with economic activities. At the producer and processor level, the challenge is to maintain or increase production while minimizing further damage to the environment. At the government level, the challenge is to develop regulations that protect public interests and resources, without reducing the ability of the sectors to compete with other markets.

Environmental challenges associated with agricultural production have been apparent in the European countries longer than Canada, the US and Australia. This is a reflection of history in terms of when the first settlements occurred, the importance of agriculture, the growth of population, and population densities. For a number of these countries, agriculture has shaped the landscape and the landscape has also shaped agriculture.

While the European countries may have a longer history, similar environmental problems exist in Canada, Australia, and the US. It should be noted that the pressure exerted by agriculture on the environment varies according to farm activities and practices. The same farming activities and practices can also have different consequences depending on local conditions. In general, agricultural pollution originates from "point source" (e.g. inappropriate manure storage) or more often, from diffuse sources (e.g. manure spreading). Regardless of the source of agricultural pollution, its impact can be both localized and widespread, and not confined to the industry. Also, it is important to note that agriculture is one type of human activity that has a direct impact on the environment.

The objective of this section is to provide a brief overview of how agriculture and agri-food impact on air quality, water quality, soil conservation, biodiversity, and landscape.

A. Environmental issues

Agricultural activities have both positive and negative environmental effects. Benefits in some countries include reduction in soil erosion through control of water flows in rivers naturally prone to flooding and habitat creation through maintenance of rangelands and agro-forestry. Agricultural policies and programs can be designed to enhance the benefits through instruments such as Best Practices, and producer education programs. This section focuses on highlighting the potential environmental degradation that could result from agricultural activities.

1. Air quality

Agriculture can contribute to greenhouse gas emissions, air particle emissions, noise and odour. Greenhouse gases that affect the temperature of the earth's surface include water vapour, troposphere ozone (O_3), chlorofluorocarbons, carbon dioxide, methane (CH_4), and nitrous oxide. The last three factors are of particular concern because they take a long time to be removed from the atmosphere.

Greenhouse gases are of global concern since they are believed to affect weather patterns, which could increase the likelihood of extreme weather events, loss of biodiversity and change in agricultural production patterns.

Agriculture is a contributor to ammonia and methane emissions. Ammonia emissions are primarily from livestock farming. Land application and storage of manure are other important sources of ammonia emissions. Ruminants are largely responsible for methane emissions in the agriculture industry. Methane and ammonia emissions can have a negative impact on the quality of air. Methane is a potent greenhouse gas, and ammonia causes acidification of soils and water. Improved methods of livestock farming and reformulation of feeds could reduce ammonia and methane emissions.

Fertilizer can also result in nitrous oxide emissions, which contribute to the greenhouse gas effect. Pesticide drift can cause long-distance pollution and their residues can contaminate rainwater.

In some rural areas, agricultural activity can lead to unpleasant smells and odour concerns in the countryside. Odour problems generally arise from storage and application of manure. The duration and severity of odour problems can be minimized by ensuring storage structures are properly operated, that field applications are scheduled, where practical, for times when nearby residents are least likely to be disturbed and through incorporation of manure into the soil.

2. Water quality

Chemical fertilizers and livestock manure represent major sources of nitrate and phosphorous in water. Nitrates and phosphorous can lead to eutrophication of fresh and coastal water and contamination of groundwater, which could affect the quality of drinking water. Groundwater is water beneath the surface of the earth and is accumulated

mainly from rain that filters through the soil.

The balance between sufficient nitrate and phosphate for crop production and the potential for surface and ground water contamination represents a major challenge to the agriculture sector. Proper handling and application of chemical fertilizer and manure can reduce the potential for excessive nitrate in water systems. Phosphate pollution can be minimized by reducing soil erosion. Manure, dairy milkhouse waste, and septic systems are potential sources of phosphate contamination.

Pesticides, herbicides and insecticides are used to control crop and livestock pests. These products can pose a threat to human health and the environment if used inappropriately. Pesticide residues in different water bodies may affect biodiversity in aquatic ecosystems, as well as terrestrial ecosystems linked to water.

Agricultural activities may also have significant effects on the quantity of water available, especially where irrigation is required. Specifically, excessive abstraction can lower the water table and increase the potential for desertification and salinisation. Drainage and irrigation can destroy natural habitats, both in wetland and steppe areas. Moreover, agriculture may contribute to floods because some farming practices decrease infiltration of water in the soil and increase run-off (e.g. soil compaction, uncovered soil, removal of hedges, and drainage).

3. Soil conservation

Soil is affected by physical, chemical and biological degradation. Agricultural activities can contribute to all three forms of degradation. The most significant forms of physical degradation caused by agriculture are erosion, desertification, water-logging, and compaction. Inappropriate land use practices such as deforestation, overgrazing, some agricultural cultivation practices, and removal of vegetative cover or hedgerows can exacerbate these occurrences. The increasing demand for water, and excessive mechanization and ploughing can also cause this form of degradation.

Chemical degradation is characterized by acidification, salinization, and contamination by micro-pollutants, such as pesticides and their metabolites, heavy metals and nutrients (e.g. nitrogen and phosphorous). The major consequences of these contamination are toxification and eutrophication. Agricultural practices that could cause chemical degradation include the inappropriate use of manure and mineral fertilizers, increasing spreading of sewage sludge on agricultural soils, use of pesticides with unintended side-effects, and irrigation practices not compatible with local conditions.

4. Biodiversity

All forms of pollution, degradation or modification of the natural media (air, water, soil) can lead directly or indirectly to a reduction in biodiversity. Some species of flora and

fauna are directly destroyed by pesticides. Some species disappear because of the destruction of their natural habitats due to fertilization, eutrophication, drainage, irrigation, rezoning, agricultural land improvement, abandonment of traditional farming practices or of specific crops and animal productions.

Wetlands represent an important component of the national and global ecosystems and the water cycle, and play a critical role in maintaining the general health of rivers, estuaries and coastal waters. Some of a wetland's environmental functions include biodiversity conservation, nursery and breeding grounds for fish and waterbirds, aesthetic, cultural and heritage values, recreation, nutrient cycling, flood mitigation through water storage and retention, ground water recharge, scientific research, education, soil and water conservation, and absorption of pollutants.

Despite growing understanding of their values and function, wetlands remain one of the most threatened resources. Changes to water flow patterns and water quality, pollution, and invasive species are major long term effects of wetland degradation and losses.

5. Nature and landscape

Intensive agriculture has an impact on the landscape in that it changes the features of traditional agriculture that have been established over previous decades and possibly centuries. Examples of this include the clearing of woods, removal of hedgerows, and realignment of watercourses. landscape degradation is often difficult to evaluate. It hinges on the value placed by society or culture on the landscape, which is part of the rural environment as well as part of the urban environment. Semi-natural landscape or "managed states" provide habitats for unique flora and fauna which are not indigenous to the ecosystem. Hence, there is a direct link between landscape and biodiversity.

III

Canada

13

Canada has four distinct agricultural production regions, including British Columbia, the Prairie Provinces, Central Canada and the Atlantic Provinces. British Columbia accounts for slightly more than 3% of Canada's farmland, the Prairie Provinces account for about 82%, Ontario and Quebec account for about 13%, and the Atlantic provinces account for almost 2%. Agricultural production varies widely from region to region, and within regions. The variation is largely due to climate, soil composition, urbanization, transportation and other factors. For example, the Prairie Provinces are composed mainly of semi-arid grasslands and sub-humid aspen parkland. The climate is highly variable, dry intense heat for a few short months and extremely harsh temperatures for much of winter. This contrasts with Central Canada, where most agricultural production takes place in the Great Lakes Basin and the St. Lawrence Lowlands. The climate in this area is relatively humid and temperate to warm.

The variation between the regions combined with differences in population density means that agri-environmental problems vary significantly from region to region, as well as within regions. As an example, British Columbia has three distinct agricultural production regions: the Peace River region, the Lower Mainland, and the Interior/Okanagan region. The Peace River region (part of the Boreal Plains ecozone) focuses largely on grain, oilseed and forage production. Dairy, poultry, hogs and horticultural crops are concentrated mainly in the Lower Mainland (part of the Pacific Maritime ecozone). The Interior region (part of the Montane Cordillera ecozone), where the climate is mild and relatively dry, focuses mainly on cattle ranching and tree fruit. Of the three regions in British Columbia, the Lower Mainland is the most densely populated. Urbanization of agricultural land has been a major issue for the past two decades.

A. Environmental issues

This section outlines the primary agri-environmental concerns in Canada.

1. Air quality

Canada's agriculture sector is both a source and sink for the greenhouse gases emitted into the atmosphere. Sources of greenhouse gases include carbon dioxide from the use of fossil fuels and oxidation of soil carbon, nitrous oxide from nitrogen fertilizers, applied manure and crop residues, and methane from livestock and manure. In 1990, agriculture contributed about 62 million tonnes of carbon dioxide equivalent, emissions. Current emission levels may be slightly lower as a result of reduced carbon emissions from agricultural soils. Agriculture contributions are about 10% of total national greenhouse gas emissions. Current AAFC estimates are that 43% of these emissions are nitrous

oxide, 30% are methane and 27% are carbon dioxide.

Agricultural sinks for greenhouse gases include crops and rangelands, as well as some soils that are storing atmospheric carbon.

Odour from livestock wastes and potential air pollutants from agricultural sources, such as pesticides and nitrogen-based fertilizers, are agri-environmental concerns. Odour from livestock waste has been an important issue for many years in some areas, such as Quebec and Ontario. For other regions, this issue is emerging as a key public concern linked. An example is in Saskatchewan, where the number of large hog production units are increasing rapidly and will produce more than half of the hogs in the province within five years. Some of the communities are demanding environmental assessments to ensure that potential problems such as odour, are taken into consideration when locating new or expanding operations.

2. Water quality

Structural changes in the intensity, concentration, and specialization of agricultural production have created nutrient surpluses in some of the humid and intensively farmed regions of Canada. Nitrates introduced by agricultural activities, have been detected in groundwater underlying the principal, intensively farmed regions of Canada. In general, the nitrate levels are within regulatory standards. However, there are areas in Canada, such as Abbotsford in southern British Columbia, and potato growing regions in New Brunswick and Prince Edward Island where nitrate levels are relatively high. In the Abbotsford aquifer, 60% of water samples tested from sensitive areas showed a nitrate level above the drinking standard of 10 ppm. For the intensively cropped potato-growing areas of New Brunswick and PEI, nitrate levels in tile drainage water from potato fields are typically in the range of 15-20 ppm considerably above the drinking water standard of 10ppm. (Agriculture and Agri-Food Canada, 1997).

Pesticide use in agriculture has leveled off in Canada since the mid-1980s, and new pest control products generally pose fewer environmental risks. However, concerns remain in some watersheds about potential impact on non-pest species and water quality.

Drainage and irrigation are important for successful crop production in certain regions of Canada (e.g. the Prairies, the Interior of BC, Ontario). The limited growing period makes drainage a necessity for some field operations. Since municipal drainage ditches are often required as an outlet for drainage water, the potential contamination of these systems and disruption of wetland are a concern. Underground tile drainage and irrigation can alter the normal seasonal pattern of water flow in streams and rivers.

In general, the risk of surface and groundwater contamination from agricultural activities is the greatest in regions with high density livestock production, requiring irrigation, and heavily fertilized or manured soil.

For the agri-food sector, effluent discharges into municipal sewer systems or watercourses may be subject to monitoring or control requirements. Control of pH is a major concern for some agri-food industries. The meat, poultry, fish, fruit and vegetable processors are most affected by requirements to abate water pollution.

3. Soil conservation

In Canada, most of the land suited to agriculture is already in production. While total production area has held largely constant, significant changes have occurred. These include reductions in summerfallow area, shifts in cropping patterns, more intensive production in some areas, and conversion of prime farm land to non-agricultural uses. While the development and use of soil-conserving practices has increased significantly since the early eighties, erosion of top soil, loss of organic matter, compaction and other forms of soil degradation continue to be a concern in certain regions. An example is Central and Eastern Canada where soil structural degradation, such as compaction, is a significant problem in some cropping areas.

The management of soil nutrients (e.g. nitrates) to balance crop productivity and potential contamination of surface and groundwater may be agriculture's greatest environmental challenge. Under-fertilization of soils, fertilization below actual crop requirements, can deplete soil nutrient reserves and organic matter over time. This was demonstrated in the prairies during the sixties and seventies. Under-fertilization of soils resulted in significant depletion of soil reserves of nitrogen, phosphorus and potassium, adversely affecting soil fertility and organic matter. Increased use of fertilizers restored the balance between fertilizer addition and crop removals of nitrogen and phosphorus in Manitoba and Saskatchewan by 1990.

In other regions such as Quebec, approximately 308,000 hectares of soils under annual crops were considered over-fertilized in 1990 and the amount of manure generated from livestock, mainly hogs and dairy cattle, exceeds the absorption capacity of the available agricultural land in some municipalities (Agriculture and Agri-Food Canada, 1997). Livestock manure is an important contributor to the organic matter content and fertility of farm soils. However, manure can also be a significant source of contamination of surface waters if applied inappropriately.

4. Biodiversity

Similar to other countries, agriculture has adversely affected biodiversity at the species and ecosystem levels through changes in the landscape, land use patterns, and the use of chemicals. At the same time, it has contributed to the preservation of biodiversity

through practices such as conservation tillage, planting shelterbelts, and maintaining farm woodlot and rangelands. One of the constraints related to the conservation of biodiversity is the lack of information.

The loss and degradation of wetlands in Canada is a major concern. An estimated 20

million hectares (one seventh of Canada's total wetland base) have been drained or lost to other functions, since the turn of the century. Millions more hectares have been seriously degraded or are at risk. The loss of wetlands has occurred in every region of the country. About 65% of the Atlantic coastal salt marshes are gone, 80 to 98% of wetlands immediately within or adjacent to many of Canada's urban centres have been lost, more than two-thirds of the wetlands once present in southern Ontario no longer exist, over half of the potholes in the central prairies have been lost, and the majority of the Pacific estuary marshes are gone or degraded.

About 85% of total known wetland conversions are for agricultural purposes. Urban growth and industrial expansion account for an additional 9%. Recreational development, hydro development, lake-level management, and drainage for forestry and peat harvesting also contribute to wetland degradation. The effects of global climatic change, groundwater pollution and acid rain on wetland are unknown, but are a concern.

B. Overview of policies and programs

Federal and provincial governments share the responsibility for agri-environmental issues. The federal government has developed a number of strategies and initiatives, which set out the principles and guidelines for addressing environmental concerns. Federal-Provincial Agreements are often used to establish joint funding programs.

Canada's concern for agri-environmental issues started in the thirties when severe droughts caused major socio-economic problems on the Prairies. It led to the first agri-environment legislation, the Prairie Farm Rehabilitation (PFR) Act. This Act focused on soil erosion, degradation and other soil related problems, and established an agency to undertake programs and projects relating to soil improvement. Several of the original programs continue to operate today (e.g. the Community Pasture Program).

The PFR Act also established a partnership approach between the federal-provincial governments in solving agri-environmental concerns. This partnership approach is reflected in subsequent federal policy and strategy documents, and in federal/provincial agreements. During the past decades, a number of federal/provincial agreements have been put in place on agri-environmental issues. These include the Economic Regional Development Agreement (ERDA), the Federal-Provincial Soil and Water Conservation Development Accords, and the St. Lawrence Vision 2000. Some federal-provincial agreements were also established under the National Soil Conservation Program (NSCP) and the Sustainable Agriculture Component of the Green Plan.

The Federal government's vision of sustainable agriculture was defined in the 1989 document *Growing Together*. This document provides a framework to integrate economic, social and environmental goals. Building on this report, the Federal-Provincial Agriculture Committee on

Environmental Sustainability released a report that recommended adjustments to agricultural practices, policy and program reform to strengthen economic viability and environmental sustainability. In its recommendations, the Committee focused primarily on the sustainability of agricultural practices. New environmental challenges have emerged for the agricultural sector since this document was released, including an increased awareness of agri-environmental issues by the public.

The 1990 federal document entitled the **Green Plan for a Healthy Environment** (commonly known as the Green Plan) represents an important watershed for environmental issues in Canada. This is the first comprehensive action plan for sustainable development. Sustainable development is defined as development that can meet both economic and environmental challenges of the 1990s and beyond.

Over a five-year period ending March 31, 1997, the **Sustainable Agriculture Initiative** under the Green Plan provided a total of C\$133.0 million to assist the agriculture and agri-food industry to implement environmentally sound practices. In recognition that environmental issues vary from region to region, C\$108.0 was allocated across provinces for regional priorities. Provinces matched federal funds through cost-shared federal-provincial agreements. The remaining funds were allocated to initiatives that are national in scope.

The Sustainable Agriculture Initiative had four objectives: 1) encourage the integration of environmental, economic and social factors into decision-making, 2) increase environmentally sound agricultural practices, 3) shared responsibility for the environment, and 4) protection and enhancement of the resource base for future generations. These objectives were achieved through national and regional initiatives targeting the protection of resources, such as water, genetic and wildlife habitat, promoting energy efficiency, reduction in waste and pollution, and adapting to climatic changes. Initiatives leading to a strengthening of partnerships were also used to meet objectives. Examples of national initiatives include the Research on the Reduction of Greenhouse Gas Emissions, Eastern Canada Soil and Water Conservation Centre, Conservation of Genetic Resources and Pest Management Alternative Strategies and Regulatory Affairs Division. Examples of regional initiatives include Environmental Farm Plans, On-Farm Research on Sustainable Practices, Environmental Awareness and Education programs and publications on Best Management Practices.

The Canadian Adaptation and Rural Development (CARD) program was established in 1995. This ongoing program has a C\$60 million budget and assists the agriculture industry in acquiring the skills and knowledge needed to adapt to changes and create opportunities. There are three components to the CARD fund: 1) adjustment programs, 2) companion programs, and 3) adaptation programs. The Adjustment Programs provide a stable transition for producers to adjust to the elimination of subsidies under the Western Grain Transportation Act and the Feed Freight Assistance Adjustment Program. The Companion Programs are funded from safety-net programs, which are cost-shared among the federal government and participating provinces and industry. Funds can be used to assist producers to manage risk or to complement adaptation efforts. Adaptation Programs fund initiatives which are broader in scope than adjustment programs.

In response to the industry's interest in having a greater role in decision-making and program delivery, the CARD fund is being delivered by national industry-led boards and industry-led adaptation councils. An adaptation council has been established in each province and territory. These councils are responsible for setting priorities, making allocation decisions and managing their province's share of the CARD funds. Several national initiatives have also been established under the CARD fund. The relevant programs are summarized in the next section.

In response to Canada's new environmental agenda (A Guide to Green Government), in 1997, the department of Agriculture and Agri-food Canada completed its sustainable development strategy entitled "Agriculture in Harmony with Nature: Strategy for Environmentally Sustainable Agriculture and Agri-food". This strategy provides a framework for integrating sustainable environmental considerations into policies and programs. It sets out four main directions for the agriculture and agri-food sectors. These include increase understanding of environmental issues, promote environmental and resource stewardship, develop innovations and solutions, and seize market opportunities.

C. Key programs for air, water and soil

1997 was a transition year for agri-environmental programs in Canada. Funding for initiatives under the Green Plan was completed on March 31, 1997. Evaluations are underway to determine the effectiveness of some of these programs, and lessons learned for future programming. New programs, such as the National Soil and Water Conservation Program, are being implemented. This section provides a summary of the key agri-environmental programs.

1. The Canadian Adaptation and Rural Development Fund (CARD)

Provincial adaptation councils will be responsible for the delivery of each province's share of the CARD fund. These councils will set priorities, and make allocation decisions within the principles and criteria set up by the CARD fund. To date, every province has either established an adaptation council or has designated an agency to manage its share of the fund.

The list of priority activities to be funded by the established adaptation councils include marketing, rural development, human resource development, and public and private partnership. Activities specific to the environment are listed for Nova Scotia, New Brunswick, Ontario, British Columbia, Saskatchewan, and Alberta. While environmental issues are not included in the priority list, the Quebec adaption council responsible for primary agriculture (l'Union des Producteurs Agricoles) has approved agri-environmental projects, such as an agri-environmental survey of hog farms. None of the adaptation councils have specified the amount to be allocated to environmental projects.

CARD funds several national programs including the National Matching Investment Initiative, and the National Soil and Water Conservation Program. Both programs are summarized below.

a) Matching Investment Initiatives (MII)

This program is designed to encourage industry investment in agri-food research and development by providing matching federal funding for collaborative research projects. This initiative receives a one-time contribution of C\$15.0 million from CARD over four years. The Research Branch may match up to 100% of industry's contribution to projects on a 50/50 cost sharing basis. In Quebec, a study is underway at the Soils and Crop Research and Development Centre, comparing corn-grain production systems. Researchers want to discover which system provides the best impact on the environment in terms of soil quality, water runoff and leaching.

b) National Soil and Water Conservation Program (NSWCP)

This two year program is designed to assist government and its agricultural industry partners to implement Canada's sustainable development strategy. In each province, a Soil and Water Conservation Program will be developed to address priority environmental sustainability issues of the region. Initiatives will focus on stewardship technology transfer, research and development, market opportunities development, and increasing understanding and awareness. All of these program areas are linked to Agriculture and Agri-Food Canada's sustainable development strategy for agriculture.

NSWCP will be delivered by industry led adaptation councils in BC, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. In Newfoundland, the Newfoundland and Labrador Federation of Agriculture is delivering the program. In the Prairies, AAFC's Prairie Farm Rehabilitation Administration will deliver the program. Eligibility criteria will vary by province depending on the key environmental sustainability issues to be addressed.

2. Shelterbelt Program

Trees and shrubs are distributed to farmers and Conservation Boards for planting on farms and in fields, for the creation of wildlife habitat and for agri-forestry initiatives. The program promotes shelterbelt planting for soil conservation, snow management and crop stabilization.

The trees and shrubs are distributed free of charge and applicants are responsible for transportation costs, and to plant and maintain the shelterbelts. This program is available in the three Prairie Provinces.

3. The Community Pasture Program

The Federal government leases marginal agricultural land from provincial governments and converts them into permanent cover areas. During the summer period, these lands are used primarily for cattle grazing. The program is designed to assist producers to strengthen their operations by providing pastures, as well as a breeding service. The formula used to allocate grazing space is designed to benefit small producers by allocating

grazing privileges in inverse proportion to land owned, leased or rented by clients. Fees are charged for all services provided on the pastures.

4. Permanent Cover Program II

Two Permanent Cover Programs were put in place by the federal government. The first program, PCP I, was introduced in 1989. The strong response to this program led to the creation of a second program, PCP II, in 1991.

The PCP I and II target class 4, 5, and 6 land as defined by the Canada Land Inventory system. These classes of land are susceptible to erosion, salinity and other degradation due to annual cultivation or summerfallow. Irrigated lands are not eligible under this program.

Under PCP II, owners of eligible land can sign a contract with the government to seed the land to forage or trees. The contract requires owners to keep the land under permanent cover for a period of 10 or 21 years. Once under contract, the land may be used for hay, grazing, forage seed, woodlot or left idle. Contracted land was given an initial payment of C\$49.40/ha (C\$20.00/acre). This payment is intended to offset some of the cash costs related to planting forages or trees. A second payment of C\$49.40/ha (C\$20.00/acre) for a 10-year contract or C\$123.50/ha (C\$50/acre) for a 21-year contract is paid to land owners. This payment offsets some of the costs related to changing from annual cropping to perennial forage. These are one time payments and individual landowners are eligible for up to a maximum of C\$64,000.

During the 1989 to 1994 period, approximately 0.4 million hectares (1.0 million acres) entered the program. This program operated in Alberta, Saskatchewan and the Peace River region of BC. Manitoba had a similar program called the Conservation Cover Program. The federal funding for the Manitoba program was about C\$0.5 million. Although the registration of this federal program ended in 1994, most of the contracted acres are still under protection. The overall cost of the program was C\$74.0 million.

PCP II is one component of the Farm Support and Adjustment Measures Program,

introduced by the federal government to help establish long-term measures to stabilize farm income. It is also designed to meet the goals for environmental sustainability outlined in the federal-provincial Agricultural Policy Review and Canada's Green Plan.

5. Pesticide Innovation Program Contracts

This program contracts with Canadian industry, universities and government and non-

¹ The payment for Alberta land owners was C\$ 74.10/ha (C\$30/ acre) for a ten year contract or C\$160.60/ha (C\$ 65/ acre) for a twenty-one year contract.

government organizations to pursue the objectives of the Pest Management Regulatory Agency.

D. Biodiversity, nature and landscape

With more than 127 million hectares of wetlands, Canada is the custodian of about one-quarter of the world's wetland resource base. Specific regions in Canada serve as an important migratory and breeding areas for certain birds and wildlife. For example, Atlantic Canada is an important breeding and staging area for several sea duck species, black ducks and geese. Another example is the southern Great Lakes (Lake Ontario and Lake Erie) and the St. Lawrence River. This is an important breeding ground for mallards and black ducks, and a significant migration route for many populations of geese and diving duck species.

Wetland conservation is a shared federal, provincial and territorial responsibility. Over 29% of all of Canada's wetlands are estimated to be located on federal lands or waters, largely in our northern territories. About 60% of total National Wildlife Areas and Migratory Bird Sanctuaries are wetland.

In 1991, the government released the **Federal Policy on Wetland Conservation**, which promotes the conservation of Canada's wetlands. The key strategies of this policy include development of public awareness and understanding of wetland resource, and encourage public participation in natural resource conservation and development strategies. This policy also commits all federal departments to the goal of no net loss of wetland functions on federal lands and water, areas affected by the implementation of federal programs, and where federal activities affect wetlands designated as ecologically or socio-economically important to a region. Detail of this policy is in Appendix B.

As a signatory to the Convention on Biological Diversity, the Canadian government developed a guide entitled the Canadian Biodiversity Strategy to implement its obligations. This guide was released in 1995 and defines several strategic directions for agriculture. These include the assessment of major agricultural policies and programs to ensure ecological, economic, social and cultural objectives are considered, and the maintenance, adjustment or development of economic incentives that promote the conservation of biodiversity and sustainable use of biological resources on agricultural lands. It also encourages producers to develop farm management plans, conservation of biological resources essential to agriculture, and the adoption of environmentally sustainable farm practices. See Appendix B for detail. On February 16, 1998, Agriculture and Agri-Food Canada (AAFC) released a strategic document entitled "Biodiversity in Agriculture—Agriculture and Agri-Food Canada's Action Plan". This is AAFC's approach to implementing the Canadian Biodiversity Strategy.

The Canadian government does not have programs dedicated to the conservation of biodiversity. The conservation of biodiversity is a component, directly and indirectly, of a number of programs targeting soil conservation and water improvement. Through partnerships with non-profit organizations, such as Ducks Unlimited Canada (DUC), the federal government

has supported the conservation of biodiversity programs.

1. Prairie CARE and Ontario Land CARE

These are two major wildlife habitat programs delivered by Ducks Unlimited Canada (DUC). CARE stands for Conservation of Agriculture, Resources and Environment. DUC has been very active in the conservation, restoration and enhancement of wetland habitat since 1938. The Ontario Land CARE program targets the improvement of land management and wetland conservation. Under this program, landowners contract with DUC to maintain and improve habitats located on their land. These agreements outline how payments are made for improving habitat. These contracts provide an opportunity to predetermine income on a specific parcel of land, and change management practices at the same time. The Ontario Land CARE program targets planned grazing systems, forage management, permanent cover, buffer management, on-farm demonstration, and water management.

Prairie CARE is DUC's largest habitat program, and is delivered in the agricultural region of Manitoba, Saskatchewan and Alberta. This program promotes the restoration and improvement of upland cover in areas of high wetland densities and high waterfowl breeding populations. The program operates by purchasing and leasing key properties for waterfowl management. It will also use management agreements to improve land for waterfowl production while maintaining agricultural use. Demonstration and extension programs promoting the benefits of alternative farming systems are also part of the program.

In BC, DUC focuses on the protection and restoration of key estuarine habitat for staging and wintering waterfowl. Estuaries surrounding Vancouver Island and along the southern mainland are under continued threat from a rapidly growing human population. Many of these estuaries also provide critical migration habitat for several species of shorebirds, in addition to their benefits for fish and shellfish. This habitat work is delivered under the banner of the Pacific Estuary Conservation Program, a multi-agency partnership involving DUC, provincial and federal government agencies and private conservation groups.

A major component of DUC's upland cover restoration program is the use of native plant material. DUC promotes the use of original native plant material for ecological and economic reasons (e.g. minimum future management cost).

2. North American Waterfowl Management Plan (NAWMP)

This is an international conservation program involving Canada, the US, and Mexico. The objective of the program is to restore waterfowl populations to average levels of the 1970's. The overall planning, design and management of the program for each of the key habitat areas is undertaken by joint ventures, partnerships of public agencies and private organizations. Between 1986 and 1996, about C\$ 337.5 million were spent in Canada under NAWMP. Expenditure by the federal government over the same period totaled C\$58.0 million, C\$5.2 million annually.

E. Key players

Federal responsibilities are limited to areas that have the potential for significant national economic impact, such as navigation and fisheries. Water on federal lands (e.g. national parks) in the territories and on the reserves of Canada's native peoples fall under federal jurisdiction. The federal government is also responsible for boundary and transboundary waters.

Environment Canada is responsible for the implementation of the Canada Wildlife Act, the Migratory Birds Act, the Endangered Species Act, the Water Act, and the Environmental Protection Act. Although Environment Canada has the responsibility for these Acts, the actual division of responsibility for some of the resources is often complex and shared. For example, under the Constitution Act, provinces own water resources, which includes both surface and groundwater, and are responsible for flow regulation, and authorization of water use development. Provinces also have the authority to legislate matters relating to water supply, pollution control, thermal and hydroelectric power development.

Shared federal-provincial responsibilities include interprovincial water issues, agriculture, significant national water issues and health. Agriculture and Agri-Food Canada (AAFC) is the federal agency responsible for promoting the development, adaptation, and competitiveness of the agriculture and agri-food sector. Through national policies, programs and services, AAFC assists the sector to maximize its contribution to economic and environmental objectives, and ensure a dependable safe supply of food (Agriculture and Agri-Food Canada, 1997).

The Pest Management Regulatory Agency (PMRA), was established within Health Canada on April 1, 1995 to implement the recommendations of the 1990 Pesticide Registration Review, conducted by stakeholders. The mandate of this agency is to protect human health and the environment by minimizing risks associated with pest control products, and to ensure users have access to pest control products and pest management strategies.

The National Agriculture Environment Committee (NAEC), formed in 1994, is an organization representing a wide range of stakeholders in the agriculture and agri-food industry. This Committee is dedicated to the development of strategies on key environmental issues. It provides relevant information and analysis, communicates the environmental vision and concerns of agricultural producers, works cooperatively with other stakeholders for solutions,

and promotes research and development on sustainable agriculture. Recently, the CARD fund provided this Committee with a contribution of C\$200,000 over two years.

IV

United States

Most of the agricultural environmental policies and programs are introduced and governed by the Federal Agriculture Improvement and Reform Act (commonly known as the FAIR Act or the 1996 Farm Act), although sections of the Clean Air and Water Acts have also had an impact on the agriculture sector. A new Farm Act is normally introduced every five to seven years. The US has had a variety of conservation and environmental programs to assist farmers to conserve and improve soil, water, and other natural resources associated with agricultural land since the 1930's. The Farm Acts have historically focused on price support and supply management issues (e.g. crop deficiency payments and annual acreage reduction programs).

There has been an increase in emphasis on environmental programs starting with the 1985 Food Security Act. Financial spending on environmental programs matched expenditures for other purposes for the first time just last year. Many of the new policies are centred on specific land conservation programs to reduce soil erosion, protect fragile environments and encourage an environmental plan for the farm through cross-compliance of program benefits provided under the 1996 FAIR Act. Programs providing education and technical assistance for environmental practices are also prevalent.

A. Environment issues

Currently the key environmental issues in the US include:

1. Air quality

There are currently no US agricultural environmental programs specifically designed to improve air quality. However, certain programs do take improvements in air quality into account, usually through reduced soil erosion from wind and conventional tillage practices. For example, an air quality factor is included in the Conservation Reserve Program (CRP) index system, however it is a very small component of the overall weighting. The degree to which agriculture negatively impacts air quality is currently under debate within the US. The Environmental Protection Agency (EPA) has proposed a tightening of air quality standards which, while not targeted specifically at agriculture, does not exclude agriculture. The new standards could affect agriculture through limits to airborne particulate matter, which could potentially restrict some farm practices.

2. Water quality

Certain regions in the US have had problems with excess nitrate levels in groundwater and waterways which is of concern for drinking water. The extent of the nitrate problem is highly specific to a particular region or location. There has also been concern over the potential contamination of drinking water by agricultural chemicals. Recent cases of hypoxia (e.g. excess nitrates in water which reduce both oxygen and marine life) have been reported in the Gulf of Mexico and the Mississippi River system. This problem has been attributed to runoff from commercial nitrogen fertilizer application and livestock waste. There are a number of different programs designed to address these water quality concerns. Some Federal and state-administered programs are mandatory, while USDA programs tend to be voluntary.

3. Soil quality

Given the wide range of climatic, soil, and other agronomic conditions in the US, it is not possible to generalize about the types of soil quality problems in the US. Soil erosion can be caused by many factors. In the northern and southern wheat plains, much of the problem is related to wind erosion. Water erosion and soil compaction are problems in certain areas of the corn belt and south-eastern regions.

B. Overview of environmental policies and programs

The US has had a variety of conservation and environmental programs to assist farmers to conserve and improve soil, water, and other natural resources associated with agricultural land. The key historical environmental program was the Agricultural Conservation Program (ACP) which was initiated in 1936. The ACP provided funds for approximately one hundred different technical practices rather than targeting specific geographic areas. Up to 75% of the total cost of implementing the practice could be paid by ACP, to a maximum of US\$3,500 (C\$4,989) per recipient. There have been a number of different long term land conservation programs at different points in time over the past 60 years.

The Clean Water Act (introduced in 1972 as the Federal Water Pollution Control Act) historically focused on discharge from factories and sewage treatment plants. In recent years, attention has turned to nonpoint sources such as runoff from agricultural operations. The Clean Water Act (CWA) does not provide direct authority for the EPA to regulate nonpoint sources, instead they authorize grants to individual States to address issues of importance in their area. Various USDA programs such as the Environmental Quality Incentives Program and the Conservation Reserve Program have components intended to improve water quality.

The majority of USDA's current environmental program expenditures are aimed at land conservation. The primary objective of these land conservation programs is to lower soil erosion. Secondary objectives include reducing sedimentation, improving water quality,

fostering wildlife habitat and providing farm income support. A number of the land conservation programs rely on the definition of the Highly Erodible Land (HEL) index to determine eligibility of cropland in a particular program. As the name implies, the HEL index rates a particular parcel of land for its susceptibility to erosion, or potential benefit to wildlife.

C. Key programs for air, water and soil

This section provides a summary of the key programs set out by type of program.

1. Land conservation and compliance programs

a) Highly Erodible Land (HEL) Conservation

This program was introduced in 1985 and requires farmers cultivating crops on highly erodible to implement soil conservation systems or risk losing certain USDA program benefits. Over 95% of highly erodible currently has approved plans which are actively being applied, or the land is enrolled in the CRP. Less than 2% of all highly erodible cropland have approved plans which are not actively being applied (e.g. these farmers are in violation of the program). Most of these plans focus on practices pertaining to cropping sequence (e.g. specific crop rotations), crop residue management (e.g. leaving some crop cover after harvest to minimize soil erosion), conservation tillage practices and/or ensuring waterways are grassed.

Net costs to producers of complying with the plans can vary substantially depending on the physical settings. In most cases the costs are relatively small and may actually improve overall revenue, such as the case for conservation tillage. However, in some cases, farmers must establish non-revenue winter cover crops or add a year to their desired crop rotation. These requirements are often specific to crops which leave limited crop residue such as sugar beets and potatoes.

The national benefit of the conservation compliance program was estimated at C\$56.80/ha (C\$23.00/acre), with water quality improvements the largest source of benefit. The estimated cost was just over C\$24.70/ha (C\$10.00/acre). The benefit/cost ratio was estimated at 2.2 for the US as a whole. However, there were large differences by region.² The benefit cost ratio for the Lake States, the North East and the Corn Belt was 5.9, 5.1 and 1.3 respectively. All three regions have some agronomic similarities to parts of Ontario, Quebec and the Maritimes.

b) Conservation Reserve Program

The largest program in terms of expenditures and land affected is the Conservation

² From Canada's perspective it is important to note that the only region with a benefit/cost ratio of less than 1.0 is the Northern Plains, which has similar agronomic characteristics to many parts of the Canadian Prairies.

Reserve Program (CRP) which was initiated in the 1985 Food Security Act. This voluntary long term land retirement program for HEL provides participants with an annual per acre rent and half the cost of establishing permanent land cover. The program will be continued through to 2002 under the 1996 FAIR Act. The maximum national area which can be enrolled has been capped at 15 million ha (36.4 million acres), which represents about 10% of total US cropland. However, as of November 1, 1997, CRP enrollment was estimated at only 9 million ha (22.8 million acres). A maximum of 25% of a state's crop area can be entered in the CRP. Most CRP acres are concentrated in the Great Plains and western Corn Belt with an annual average payment of C\$380.50/ha (C\$70.00/acre). This program is estimated to have reduced cropland erosion by 20% compared to conditions prior to the CRP.

Under the 1996 FAIR Act, the definition of highly erodable land is revised to place more emphasis on environmental factors. One major change is excluding cropland with an HEL rating of less than 8, to be eligible for inclusion in the CRP. A national ranking process is used to determine the amount of acreage which can be approved in each State. The four environmental factors used to determine eligibility are: water quality protection (both ground and surface water max. 20 points), creation of wildlife habitat (max. 20 points), control of soil erodibility (max. 20 points), and tree planting (max. 10 points). A fifth factor is the cost of enrolling each parcel of land. Certain acres which are devoted exclusively to filter strips or shelter belts will automatically receive maximum environmental scores. Each applicant is informed of the maximum acceptable rental payment for the cropland offered, based on the productivity of the soil.

The CRP acceptance rules are changed again in early 1997. The new Environmental Benefits Index (EBI) is expanded to include seven factors: wildlife habitat benefits (max. 100 points), water quality benefits (max. 100 points), on farm benefits of reduced erosion (max. 100 points), long term benefits of cover beyond contract period (max. 50 points), air quality benefits from reduced erosion (max. 25 points), conservation priority areas (max. 25 points) and cost (max. 200). The new rules expand the base of eligible lands to more than 97 million hectares (240 million acres), an increase of 57 million hectares (140 million acres) from the initial guidelines. Most of the new area is adjacent to water bodies and cropped wetlands.

The CRP is viewed as a significant benefit and a source of income for many farmers. The recent changes in EBI and exclusion of cropland with an EI of less than 8 did cause concern among some producers who had counted on keeping this land under the CRP for an extended period of time. The changes in the EBI also created some confusion among some producers whose proposals were unexpectedly turned down, which in some cases, was a result of misunderstandings related to the new indexing system.

c) Wetlands Reserve Programs

The long term goal of wetland programs is to achieve a net gain in wetlands which would partly reverse the historic decline. Most policy to date has focused on total

wetland area; however, as the rate of loss declines more attention is being focused on quality aspects. There has been controversy over what is defined as a wetland, particularly between landowners and environmentalists. The current wetland definition is, "an area which is saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions".

Until 1978, some government programs encouraged conversion of wetlands to other uses. Indirect Federal assistance for wetland conversion was eliminated by the Swampbuster provision of the 1985 Food Security Act. This provision made a farm operator ineligible for program benefits for any year in which an annual crop was planted on converted wetlands. The Wetland Reserve Program was established in 1990 with the goal of restoring 394,577 hectares (975,000 acres) to wetlands by 2002. In the 1996 FAIR Act, the goal was reaffirmed and requires one-third of the wetland reserve area to be enrolled in a 30-year easement, cost-sharing agreement, permanent easement. Farmers have been reluctant to cede rights to cropland permanently, instead favouring shorter term obligations. The landowner is allowed certain economic uses of the land such as hunting, fishing, grazing at certain times and selective timber harvest. The farmer is paid up to 75% of the cost of restoring the former wetland.

Most of the land under this program is in the south eastern US. The average cost of enrollment ranges from C\$5,283.00/ha (C\$2,138.00/acre) in New Hampshire, to less than C\$1,761.80/ha (C\$713.00/acre) in South Dakota. There is also an Emergency Wetlands Reserve Program which is a voluntary program helping landowners convert flood-damaged cropland back to wetlands. To date, more than 30,352 hectares (75,000 acres) have been enrolled in this program, primarily in Missouri and Iowa.

d) Environmental Quality Incentives Program (EQIP)

The EQIP program was established by the 1996 FAIR Act to consolidate the ACP, the Water Quality Incentive Program, and two regional land conservation programs. It is to be managed by the National Resources Conservation Service (NRCS) of the USDA and its goal is to encourage farmers and ranchers to adopt practices to reduce environmental problems by providing education, technical assistance and incentive payments. Half of the funds are to be targeted at conservation practices relating to livestock production.

The NRCS attempts to target EQIP funds by soliciting information from State Conservationists agencies on key regional environmental problems, and evaluating and prioritizing this information from a national perspective. The fund's budget is US\$200.0 million (C\$285.0 million) per year, which is allocated to individual State Conservationist agencies which are to ensure that environmental benefits are maximized. Some producers outside priority areas may receive EQIP assistance, especially for low cost practices such as nutrient testing. Payments to an individual producer may not exceed US\$10,000 (C\$14,255) for a fiscal year, or US\$50,000 (C\$71,275) for a multi-year contract.

The two regional soil and water quality programs which were incorporated into EQIP in 1996 focus on the Great Plains and Colorado River Basin. The Great Plains Conservation Program (GPCP), initiated in 1957, provides technical and financial assistance in the Great Plain States for conservation treatment on entire operating units covering nearly 16 million acres. The Colorado River Salinity Control Program (CRSCP) is intended to identify salt source areas in the Colorado River Basin and to carry out research, monitor progress and provide education and financial assistance to reduce salt in groundwater. This includes financial incentives to use more efficient irrigation systems.

2. Water quality

Federal water quality programs are administered by both the EPA and the USDA. The EPA's role is to authorize grants to States to promote nonpoint source management plans. In 1995, EPA provided over US\$274.0 million (C\$391.0 million) in grants, US\$107.0 million (C\$153.0 million) of which was for agriculture. One exception to this rule is that large animal operations are required to obtain permits for effluent waste from the EPA under the CWA. Individual effluent limits from large confined animal operations, defined as an operation with over 1,000 animal units where the animal unit is over 25 kg (55lb.), fall under the National Pollutant Discharge Elimination System (NPDES). Over 6,000 operations are large enough to require permits. However, enforcement has been a problem and many facilities still lack permits. The small watershed program provides Federal assistance to States for flood prevention, watershed protection and water management.

3. Air quality

The Water Quality Incentive Projects (WQIP) was introduced in the 1990 Food, Agriculture, Conservation, and Trade Act, with the goal of reducing agricultural pollutants by subsidizing farm management practices that restore or enhance water resources. A total of 242 projects were started during fiscal years 1993-95. State agencies identify eligible areas and producers enter into a 3-5 year agreement to implement an approved management practice. The average incentive payment was about C\$28.20/ha (C\$11.40/acre). The WQIP was consolidated into EQIP by the 1996 FAIR Act, although the basic design and goals of the program have remained unchanged.

The EPA has proposed changes to the Clean Air Act which would require the agriculture industry to meet new standards. President Clinton recently endorsed the EPA's plan despite opposition by most in the agricultural industry and Congress. Although this plan is not directed at agriculture, the fact that agriculture is not being exempted from the standards may foreshadow future steps to control agriculturally-related air borne contaminants. The section which would affect agriculture relates to limits on particulate

matter. The most contentious issue is the so-called PM-2.5 standard, which seeks to eliminate particulate matter smaller than 2.5 microns. Some studies conclude that agricultural production contributes a large percentage of airborne fine particulate matter. The EPA proposal could be burdensome for the agriculture sector by boosting fuel costs

as well as restricting tilling practices, crop spraying and possibly certain liquid fertilizer applications.

4. Education and extension programs

In addition to the EQIP program other technical assistance is provided to farmers under a couple of other programs. The Conservation Technical Assistance (CTA) program provides assistance to farmers for planning and implementing soil and water conservation and water quality practices. The Conservation of Private Grazing Land Initiative provides a technical and educational assistance for landowners of non-Federal grazing land and hay land. It has been allocated US\$40.0 million (C\$57.0 million) in 1997 and US\$60.0 million (C\$86.0 million) in 1998 and beyond and is intended to help preserve water quality, improve wildlife habitat and help with weed and brush problems. The Cooperative State Research, Extension, and Education Service also provides information and recommendations on soil conservation and water quality practices.

5. Other environmental programs

The 1996 FAIR ACT makes it a requirement that private applicators of restricted pesticides maintain records accessible to State and Federal agencies regarding products applied, amount, date and location of application.

There are various programs to encourage tree planting and development of forest stewardship plans for private forest lands. There are also a number of programs for disaster prevention and assistance. One program assists in flood prevention and another provides assistance to farmers to rehabilitate cropland damaged by natural disasters.

The Farmland Protection Program (FPP) was established in 1996 to assist states, Indian tribes and local governments to purchase voluntary conservation easements or other lands with unique attributes. The USDA agreed to allocate US\$14.5 million (C\$20.6 million) for this purpose in fiscal year 1996, but limited the funding to US\$2.0 million (C\$2.8 million) in 1997.

D. Biodiversity, nature and landscape

The Wildlife Habitat Incentives Program (WHIP) was created by the 1996 FAIR Act to provide cost sharing assistance to landowners to develop habitat for most types of wildlife. The program has a fund of US\$50.0 million (C\$71.3 million) for 1996-2002. Cost sharing payments may be used to establish designated practices, while contracts for habitat development are for a minimum ten-year period.

The Water Bank Program (WBP) was designed to preserve and restore wetlands for migratory waterfowl and other wildlife. It was initiated in 1970 but funding was eliminated in 1995. Although the CRP is not specifically a wildlife program, a significant component (15%) of the CRP's index is weighted toward potential wildlife habitat benefits.

E. Key players

Most agriculture environmental legislation is initiated under the US Farm Act. The majority of these programs are administered by the USDA, specifically the National Resources Conservation Service (NRCS). Most of the environmental USDA programs are voluntary in nature, or are designed so that compliance with the program results in a loss of non-environmental program benefits. The NRCS (formerly the soil Conservation Service) has a long history of overseeing land set-aside programs under the old base acre system right down to the county level.

Programs under the Clean Air Act and the Clean Water Act are administered by the Environmental Protection Agency (EPA), however in most instances the agency oversees the allocation of grants to individual State Conservationists agencies. The State agencies offer the benefit of more specific and detailed knowledge of the environmental factors in their particular region. The US Department of the Interior and the Army Corps of Engineers also play a role in water resource conservation, including irrigation, flood control and wetlands.

V European Union

The European Union (EU) is an economic and political organization of 15 European countries, including France, Denmark and the Netherlands.³ Within the Union, a number of institutions have been developed to undertake specific activities. One of the major institutions is the **European Commission**, which is responsible for formulating and initiating policy proposals, including agriculture. The Commission has the right of initiative, but it does not make the main decisions on EU policies and priorities. The Commission is also responsible for day-to-day management of the Common Agricultural Policy (CAP), a program that will be reviewed later in this section.

All policies and programs are issued as a Directive or Regulation. **Directives** set out the framework for Member States to develop programs. The degree of detail in a Directive determines the degree of freedom accorded to the individual Member States. Directives are the most usual type of legislative measures for environmental issues. **Regulations** are rules that are immediately applicable to all Member States and citizens have to comply with them as if they were national laws.

With respect to agri-environment issues, the EU institutions do not operate any programs and makes no direct agreements with farmers apart from a few pilot and research programs launched directly by the Commission. The role of the commission is mainly to ensure the programs approved for joint funding with Member States meet EU environmental objectives and conditions set out in specific directives and regulations.

A. Environmental issues in Member States

In keeping with the diverse landscape, natural resources, industry structure and agricultural practices across the EU, environmental issues vary from country to country. Similar variations exist within a country. In the Netherlands and Denmark, intensive agricultural production practices have resulted in a number of environmental concerns relating to methane and ammonia emissions, efficient and effective disposal of surplus manure, and use of pesticides and herbicides. The size of the country, density of the population, intensity of production and its dependence on groundwater for drinking have made these problems prevalent throughout most agricultural areas of these two countries. For the larger countries with a lower population density (e.g. France), these concerns are more prevalent in specific regions. For example, the

³ The European Union currently comprises of Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Holland, Ireland, Italy, Luxembourg, Portugal, Spain and Sweden.

disposal of excess manure is primarily a concern in the Bretagne area where there is a relatively high concentration of livestock production.

In general, environmental issues within the EU can be grouped as follows:

1. Air quality

Ammonia and methane emissions have an impact on the atmosphere, particularly on air quality. Methane emissions contribute to the greenhouse gas effect, and ammonia emissions contribute to acid rain, which damages forests.

2. Water quality

The major issue is nutrient pollution in the aquatic environment (e.g. ground water, surface water and marine water). Some of the member countries are highly dependent on groundwater for their drinking water. As a result, rising nitrate and phosphorous levels in the aquatic environment is a major concern in these areas. These nutrients could lead to contamination of drinking water and ecological imbalance due to eutrophication. In addition, depletion of ground water is another significant issue. The increasing demand for water by the agriculture sector in some countries has also raised concerns. Depletion of groundwater could cause damage to biodiversity and result in salinisation.

3. Soil quality

The high concentration of livestock production in certain regions of Member States have resulted in excess manure production. Excess manure is the quantity of manure that can not be applied to the soil without causing potential degradation of the soil and possibly water systems. For these regions, the challenge is to develop efficient and effective methods of disposing of the excess manure.

4. Landscape

In many of the Member States, agriculture has helped shaped the country's landscape and ecosystems over the centuries. This resulted in a certain balance. However, recent changes in farm structure and practices have increased pressure on this balance. In some instances, the balance has shifted resulting in the destruction of biodiversity and sensitive ecosystems.

B. Overview of environmental policies, directives and regulations

The Treaty of Rome⁴ established the foundation for the Common Agricultural Policy (CAP), the most important economic policy in the EU. The objectives of the original CAP included: 1) increased productivity, 2) an equitable standard of living for farm community, 3) stabilized markets, 4) an adequate food supply, and 5) reasonable food prices for consumers. There was no recognition of potential environmental concerns within the program. To achieve these objectives, economic instruments, such as price supports and deficiency payments as well as trade barriers were implemented.

A summary of important European Union environmental policies, regulations and directives is provided in Exhibit V-1.

⁴ *Treaty of Rome is the agreement that established the European Union in 1958.*

Exhibit V-1

Chronological summary of key environmental policies, regulations and directives in the European Union

Year	Title and Primary Objectives	Impact on Member States
1962	<i>The Common Agricultural Policy</i> : Provides a set of common policies for increasing production within the EU. Price supports were introduced to stabilize markets, and ensure equity amongst producers.	Producers within the EU are required to produce in accordance to the support levels, and deficiency payments.
1972	<i>Environmental Action Program (EAP)</i> : Sets out the principles and objectives concerning the environment.	
1975	<i>Directive on Less Favored Areas</i> .	
1985	<i>Common Agriculture Policy Perspectives</i> : Policy document that presented several options for the future development of the CAP. This document acknowledges that the protection of environment is one of the major functions of agriculture and states that measures have to be taken to prevent environmental degradation.	No action required
1987	<i>Directive 85/337/EEC Environmental Impact Assessment</i> : Targets the harmonization of environmental assessment across its Member State.	Requires Member States to undertake environmental impact assessments on projects, including agriculture, that are likely to have a significant impact on the environment.
1987	<i>Regulation 797/85 EEC and Regulation 1760/87 EEC</i> : Aims to improve the efficiency of agricultural structures, including a set of measures for environmental protection. Article 19 authorizes national aid in environmentally sensitive areas.	
1987	<i>Single European Act (SEA)</i> : Provides the legal basis to Environmental Policy, and integrates environmental protection into EU policies.	Requires environmental considerations be taken into account in all policy decisions.
1988	<i>Our Farming Future</i> : Document calls for rules limiting some damaging agricultural practices and encouraging practices with beneficial effects on the environment. These rules were to be accompanied by incentives or compensatory measures.	No actions required by Member States.
1991	<i>Regulation 2328/91 EEC</i> : Aims to improve agricultural structure efficiency including incentives for an agriculture compatible with the environment in the environmentally sensitive areas and in less favoured areas	

Exhibit V-1 (Cont'd)**Chronological summary of key environmental policies, regulations and directives in the European Union**

Year	Title and Primary Objectives	Impact on Member States
1991	<i>Directive 91/676/EEC Nitrates</i> : To reduce water pollution caused or induced by nitrates from agricultural sources and the prevention of further such pollution.	Member States are required to identify vulnerable zones and to establish action programs (e.g. programs limiting land application of manure) for the designated areas. These programs have to be implemented within four years of establishment, and ensure that the maximum level of manure spread within a zone is 170 kg N/ha. Codes of good agricultural practice have to be established, but implemented by farmers on a voluntary basis.
1992	<i>Fifth Environmental Action Program</i> : Sets out the fundamental objectives of maintaining the basic natural processes indispensable for a sustainable agriculture sector through the conservation of water, soil and genetic resources. It includes specific objectives to reduce chemical inputs, to achieve a balance between nutrient inputs and the absorption capacity of the soil and plants, to promote rural environmental management practices, to conserve biodiversity and natural habits and to minimize natural risks	
1992	<i>Common Agricultural Policy (1992 Reforms) and Accompanying Measures (Regulation 2078/92 and Regulation 2080/92)</i> : Aimed primarily at restructuring agricultural markets. One of the central element was the encouragement of farmers to use less intensive production methods, thereby reducing their impact on the environment and cutting creation of unwanted surpluses. The Union also agreed to a set of complementary agri-environment and afforestation measures. Reduction of agricultural pollution and changes in a number of sectors to meet market requirements, through the encouragement of less intensive production methods compatible with the requirements of environmental protection and the maintenance of the countryside.	Under the Accompanying Measures, Member States are required to develop programs that target the reduction of nutrient pollutants, soil conservation, preservation of biodiversity, nature and landscape.
1992	<i>Treaty on European Union (Maastricht Treaty)</i> : This treaty came into effect in 1993. It embodies the concept of sustainability and reinforced environmental policy by stating the obligation of integrating environmental requirements in all EU policies.	No specific actions are required.

The EU's recognition of the importance of agri-environmental issues started in the early seventies, with the adoption of the first Environmental Action Program (EAP). This political document set out the principles and objectives concerning the environment. In the agricultural sector, this document led to the adoption of the Directive on Less Favoured Areas in 1975.

Between the mid seventies and mid eighties, a number of environmental policies were established through EAP. The adoption of the Single European Act (SEA) in 1987 provided the legal basis to Environmental policy. During the same period, other important measures were adopted to recognize the impact of agricultural production on the environment. The structural funds⁵ were reformed to increase their consistency and effectiveness with the new measures. Some of the key measures include:

- Regulation 797/85/EEC: Article 19 of this regulation authorized national assistance in environmentally sensitive areas.
- Regulation 1760/87/EEC: Amended Regulation 797/85EEC to allow for greater assistance to environmentally sensitive areas, natural resources and landscape.
- Regulation 2328/91/EEC: Aims to improve the efficiency of the agricultural structure. It authorizes incentives for an agriculture sector that is compatible with the environment, particularly in sensitive and less favoured areas.
- Directive 91/676/EEC: Targets the reduction of water pollution caused or induced by nitrates from agricultural sources and the prevention of further pollution. Member States are to identify vulnerable zones and to establish action programs to be implemented within four years of establishment. Action programs are to include mandatory measures.

In the early nineties, environmental policy focused on the principle of sustainability. The Maastricht Treaty, which came into effect in 1993, incorporated this principle and reinforced environmental policy by integrating environmental requirements in all EU policies. A new political focus was given by the Fifth Environmental Action Program adopted by the Commission in 1992.

Agriculture is one of the five target sectors of the Fifth Environmental Action Program. This program introduced economic or market-based instruments to change environmentally damaging behaviour, integrate environmental considerations into policy areas, and to develop partnerships with shared responsibilities between government, business and the general public. The features of sustainability include the maintenance of quality of life, access to natural

⁵ *The Structural Fund is one component of the European Agricultural Guidance and Guarantee Fund (EAGGF). This fund is specific to structural policy, such as assistance for the modernization of holdings, processing and marketing, and diversification.*

resources, avoiding environmental damage, and meeting present needs without compromising the ability of the future generations to meet their own needs.

The CAP program was also reformed in 1992. Since its inception, a number of assessments have shown that CAP has had a considerable impact on the environment. This program has been extremely successful in meeting its goals, especially in increasing production. For a number of the commodities, the Member States moved from a net importer to a net exporter. The continuous adoption of new technology and techniques has resulted in major structural changes in the agriculture sector, as well as farm practices for its Member States. Under this program, agriculture production has become more intensive and concentrated. The use of chemical fertilizer and pesticides has increased. Intensification of the sector, combined with heavy use of chemicals, has added pressure on the environment, particularly soil, water, air and biodiversity. Most of these changes in farm structure and practices have contributed to various forms of environmental degradation, including the reshaping of some landscape. However, some suggest that there is a positive component to CAP, in that it may have reduced the rate of urban encroachment on farmland, which may have resulted in the preservation of some fragile ecosystems.

It should be noted that while concern for the environment has been presented as one of the reasons for the reform of CAP, budgetary constraint is a major cause for the reform, together with the need to adapt to international trade agreements and to prepare for the enlargement of the EU to Eastern Europe. CAP is the single most important expenditure under the EU budget. In 1997, spending on CAP programs totaled ECU 40.8 billion (C\$67.7 billion), 46% of total EU budget of ECU 89.1 billion (C\$ 147.9 billion).

The reform on CAP focused on reducing price support levels to producers over a period of three years. Compensatory payments were made to producers over the same period. For some crops, the compensatory payments were linked to set-asides. For cattle production, payments were made on the basis of maximum stocking rates per hectare. Additional premiums were paid to producers for a stocking rate of less than 1.4 livestock units per hectare. The goal is to encourage extensive production practices.

The reformed CAP also included a set of Accompanying Measures, which cover agri-environment, afforestation and early retirement. Under these measures, farmers can be paid for using environmentally friendly production techniques, such as a reduced rate of fertilizer application and plant protection products, and the adoption of more extensive intermediate input production practices. Other examples are improved crop rotation, establishment of a green cover during winter, actions for erosion control, protection of ecologically valuable habitat, fostering the development of biodiversity, organic farming, and landscape improvement.

The EU lists seven objectives for the agri-environment measures. These include:

- use of farming practices that will reduce the polluting effects of agriculture;
- extensification of farming and conversion of arable land to extensive grassland;
- protection and improvement of the environment, countryside, landscape, natural resources, and soil and genetic diversity;
- upkeep of abandoned farmland and woodlands;
- long-term environmental set-aside;
- land management for public access; and
- education and training.

These goals are reflected in the guidelines for country programs. Most of the guidelines target land management through the following:

- Low-input and organic farming: To reduce substantially the use of fertilizers and plant protection products, to keep the reductions already made, to introduce or continue with organic farming.
- Extensive crop and forage production: To change to more extensive forms of crop production, including forage production (by methods other than those covered by low-input and organic farming), to maintain extensive production methods, or to convert arable land into extensive grassland.
- Extensification of livestock production: To reduce the proportion of sheep and cattle per forage area.
- Other environmental farming practices: To use other practices compatible with the protection of the environment and natural resources, as well as maintenance of the countryside and the landscape, or to rear animals of local breeds in danger of extinction.
- Long-term set-aside: To set-aside farmland for at least 20 years and use it for environmental purposes, in particular for biotope reserves, natural parks or protection of hydrological systems.
- Public access: To allow walkers on private farmland.

C. Key programs developed by Member States

Under the agri-environment regulation of the Accompanying Measures in the CAP reform, more than 127 programs were approved by the Commission by June 1997. A number of existing programs have been amended to reflect the objectives of the Accompanying Measures. The EU Commission has approved a total of 265 programs and amendments (Commission of the European Communities, 1997).

The approved programs are extremely diverse in nature resulting in limited comparison between Member State programs. Within each Member State, the approved programs will have a national, regional, or local focus depending on the division of government authority, as well as environmental diversity. Emphasis on the different environmental objectives of the programs vary widely among Member States. Most of the variation can be attributed to difference in awareness amongst farmers, and the environmental issues within Member States.

In general, Finland, Greece, Ireland, Luxembourg, the Netherlands, Portugal and Sweden have implemented mostly national programs. In contrast, Germany and Italy have implemented mainly regional programs. Austria, Belgium, Denmark, France, Spain and the United Kingdom have a combination of national and regional programs. Within most of the national and regional programs, some or all measures target environmental zones and are designed to meet specific local goals. To date, the Commission has not received any proposal for programs spanning Member State boundaries.

In an effort to compare programs across its Member States, the EU has divided the programs into three major categories, with some sub-classes (Commission of the European Communities, 1997). These include:

- Environmentally-beneficial productive farming
 - organic farming
 - non-organic farming with environmental improvements
 - maintenance of existing low-intensity systems
- Non-productive land management (20 year set-aside, maintenance of abandoned land, landscape features, public access, etc.)
- Training and demonstration projects

The main emphasis of the agri-environment programs in Member States, with the exception of the Netherlands, is on reducing environmental stress that result from intensive farming. The EU uses the term "environmentally-beneficial productive farming". Over 80% of program expenditure across the EU is budgeted to support "environmentally-beneficial productive farming". Exhibit V-2 shows the estimated breakdown for average program expenditures, based on programs approved by March 1996 for the EU countries selected for this study.

Exhibit V-2**Estimated proportion of budgeted spending in selected Member State**

Type of Measure	Denmark (%)	France (%)	Netherlands (%)	EU-15* (%)
1a. Organic farming	24	3	2	8
1b. Farming with environmental improvements	46	15	32	41
1c. Maintenance of low intensity systems	16	79	0	35
2. Non-productive land management	14	3	0	14
3. Training and demonstration projects	0	1	66	3
Total	100	100	100	100

*EU-12 from 1985-86; unified Germany from 1990-91; EU-15 from 1994-95, includes Austria, Finland and Sweden.
Source: Commission of the European Communities. December 1997. *Application of Council Regulation (EEC) No. 2078/92 on Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside. COM(97) 620 final. Report from the Commission to the Council and the European Parliament.*

The primary aim of the first category (1a - 1c) is to alleviate pressure on the environment. Most of the programs in the Member States focus on reducing levels of inputs, promotion of organic farming, and lowering the level of animal density per hectare. Almost all of the Member States have these programs, some of the programs were put in place prior to this EU regulation.

The second group of programs target the maintenance of traditional landscape features and to protect and enhance natural biodiversity. Much of the European landscape is characterized by specific features, such as stone walls, terraces, and hedges. To maintain these features and to preserve and enhance their associated biodiversity, programs are needed to ensure their continuity.

The 1995 budget for programs under the agri-environment regulation was ECU 990.0 million (C\$1,643.0 million), but the actual expenditure was ECU 482.0 million (C\$800.0 million). In France, about 24 national and regional agri-environmental programs were approved by the Commission in 1994. A majority of the dollars were devoted to the national measure for the maintenance of extensive grassland, under which 17% of agricultural land is eligible for payments. Under this program producers who apply extensive production techniques receive ECU 46/ha (C\$100/ha) of grassland, leading to roughly ECU 230.0 million (C\$382.0 million) in payments to livestock farmers in 1995, including a 50% funding from the EU. In the Netherlands, agri-environmental programs under Regulation 2078/92 cover only 3% of the territory for a total cost of ECU 110.0 million (C\$182.6 million) for 1994-97.

The EU will share costs with its Member States up to 50% of the program costs under the Accompanying Measures. There is an exception though, for countries with a per capita EDP less than 75% of the EU average. In this case, financing up to 75% is available (as a result, Denmark, the Netherlands and France are supported up to 50%). Maximum annual premiums for various measures are summarized in Exhibit V-3.

Exhibit V-3

Summary of maximum annual premiums

Measure	Maximum Annual Premium Eligible for Joint-financing by the EU
Crop extensification and organic farming	1. Annual crops covered by CMO: ECU 181.1/ha (C\$300/ha) 2. Other annual crops and pasture: ECU/ha 301.9 (C\$501/ha) 3. Specialized olive groves: ECU 483/ha (C\$802/ha) 4. Citrus fruits: ECU 1,208/ha (C\$2,005/ha) 5. Other perennial crops and wine: ECU/ha 845.3 (C\$1,403/ha)
Livestock extensification	ECU 253.6 (C\$421) for each livestock unit by which a herd is reduced.
Rearing of endangered breeds	ECU 120.8/ha (C\$200) for each livestock unit reared.
Upkeep of abandoned land	ECU 301.9/ha (C\$501/ha)
Long-term (20 years) set-aside	ECU 724.5/ha (C\$1,202/ha)
Cultivation of plant threatened by genetic erosion	ECU 301.9/ha (C\$501/ha)
Training	ECU 3,019 (C\$5,011) per person completing a full course or traineeship.

Source: European Commission. 1997. *CAP Working Notes: Agriculture and Environment, Special Issue*. Directorate General for Agriculture (DG VI).

This EU regulation allows Member States to implement additional programs funded exclusively by national budgets, provided they receive the Commission's approval. Approval is generally given, provided the payments under the national programs do not distort competition between EU countries, and the objectives are in keeping with the EU environmental goals.

The development of Accompanying Measures is mandatory for Member States, but

participation by farmers is on a voluntary basis. Programs under Regulation 2078/92 are defined and implemented under the Commission's control. However, the possibility of national programs, together with the latitude member states have to define eligibility criteria and level of payments make it possible to provide potentially significant national support to farmers under agri-environmental schemes.

For afforestation on farms, Regulation 2080/92 provides financing arrangements similar to those under the agri-environment regulation.

To receive payment, farmers are required to undertake actions to maintain or improve the environment. Farmers are usually required to enter into contracts with the government, and payments are calculated on the basis of actual income foregone as a result of reduced production or higher costs. Enrollment in a program under regulation 2078/92 requires farmers to commit for a minimum of five years.

VI

Netherlands

The Netherlands is one of the most densely populated countries in the world. Total land area is about 3.4 million hectares, excluding reclaimed land of 0.6 million hectares. Approximately 65% of the total land area is devoted to intensive agriculture, and Dutch farms are among the most productive in the world. Environmental issues have been important to the Netherlands, since the early seventies. Over the last two decades, environmental policies and programs in the Netherlands have shifted from medium oriented (e.g. air, soil) to sources of problem (e.g. manure).

A. Environmental issues

Currently, Netherlands has the following environmental concerns:

1. Air quality

Ammonia and methane emissions from livestock production are important issues and ammonia emissions contribute to acidification (about 90% of ammonia emissions originate from agriculture). Ammonia's contribution to total national acid deposition is about 50%. In regions with high livestock densities, this can be as high as 60%. General odour problems from livestock farming is also a concern.

2. Water quality

The potential overloading of water with nutrients such as nitrogen and phosphorus, and the depletion of groundwater are major environmental concerns. Intensive agriculture, dense population, and transboundary water inflows are all contributors to eutrophication. Domestically, agriculture is responsible for 70% of all eutrophying agents. About 50% (300,000 ha) of the cultivated land in the Netherlands is assessed to be saturated with phosphate. It is anticipated that leaching losses may occur in future as the buffering capacity of soil reaches its limit. Quality standards for nitrate in ground water are exceeded in about 70% of the sandy soils used for agriculture. In total, 40% of agricultural area exceeds 50 mg/l, the maximum standard adopted by Netherlands. The target level of 25 mg/l is exceeded by two-thirds of total agriculture area.

Groundwater depletion or desiccation is also another concern. About 10% of the Netherlands is affected by permanently lowered water tables. The Dutch officially recognize desiccation in areas that are designated to have a nature-conserving function

or in which the water table is too low or seepage is too weak to protect ecological characteristics dependent on groundwater.

3. Soil

Biological degradation resulting from excess nitrate and phosphorus, and acidity of soil are major concerns in the Netherlands.

B. Overview of environmental policies and programs

The Netherlands developed its first comprehensive statement on environmental policies in 1972, which was entitled "Memorandum on Urgent Environmental Issues". This policy specified major environmental problems and identified long-term strategies to combat them. By the end of the 1970's, the Netherlands had developed a set of environmental laws targeting specific media, such as air or soil.

The eighties was a decade of evolution in environmental strategy, as the country moved from media-specific to integrated policies aimed at the source of problems. During this period, the Netherlands developed a number of policies and programs to combat acidification, eutrophication and desiccation. Most of the programs focused on abatement at source. Recognizing the impact of livestock manure on water, soil and air, the government introduced the Interim Law in 1984. This law limited the expansion of hog and poultry production, as a method to prevent further increases in manure production. Subsequent analysis suggest that the law was not an effective regulation and a Three Phase Plan was introduced in 1987. This Plan phased in a number of programs restricting the application of manure, manure quotas, mandatory preparation of manure balance sheets and a levy on surplus manure. In addition, it introduced the Manure Law and the Soil Protection Act.

The Manure Law limits the quantity of manure that a producer is allowed to produce and the Soil Protection Act restricts the use of manure. Under the later Act, standards were set for the use of manure on farms. These standards mean that farmers must find alternative methods to dispose of surplus manure. This measure was selected on the basis that phosphate levels in manure are relatively constant, and that an environmentally sound phosphate would lead to a reduction in the levels of other substances in manure. For soils unable to fix any phosphate, the provisional targets represent standards needed to balance soil nutrients. In 1995, these standards included chemical fertilizers.

Environmental philosophy took another direction through the adoption of the country's first National Environmental Policy Plan (NEPP) or Green Plan in 1989. The impetus for NEPP was a 1988 report entitled Concern for Tomorrow, which recognized the earth's limits for environmental stresses, such as resource extraction rates and critical loads of individual pollutants. This report, combined with several environmental events, served to crystallize public support for the environment.

The NEPP established the basic principles of Dutch environmental strategy. These principles

are maintained in subsequent policy documents. The primary principle is that environmental policy must be comprehensive and fully integrated by all relevant parties. Other major principles include intergenerational equity, abatement at source, and the polluter pays principle. Appendix B provides a detailed summary of NEPP and NEPP 2, which was released in 1994.

The major principles of the NEPP were incorporated into the 1995 Policy Document on Manure and Ammonia. This policy centres on mineral accounting, a system for producers to keep track of their total mineral input and output (phosphate and nitrogen). Ideally, mineral input should equal mineral losses. Maximum allowable mineral losses were established under this policy. Farmers exceeding these levels, which are described in the program section, will be penalized. The maximum allowable losses will be reduced gradually.

Most Dutch environmental policy consists of direct regulation and voluntary agreements, although the use of economic instruments is increasing (OECD, 1994). The Netherlands uses several means to achieve environmental goals (e.g. covenants and economic charges).

1. Covenants

Voluntary agreements between the government and a targeted industry group. The agreements usually commit the industry organization to aggressive environmental protection in exchange for more flexible self imposed solutions. Under the covenants, the government specifies required results by a certain deadline (e.g. reductions in emissions), but allows industry to identify the means of achieving the goals. Agriculture was identified as a target 'group' in the National Environmental Policy Plan.

2. Economic charges

Includes subsidies for environmental investments as well as charges, or user fees for pollution treatment services. The main purpose of charges is to fund environmental programs rather than to change behaviour. In 1994, the revenue from charges was 4.3 billion Guilders, which provided more than half of the total money spent on the environment by public bodies. Charges have also proven to be a more effective incentive in reducing effluent than regulatory approaches. Examples of these programs include the Water Pollution Charges, the Charge for Soil Protection and the Charge on Surplus Manure.

Exhibit VI-1 provides a chronological summary of the key policies and associated programs specific to agriculture.

Exhibit VI-1

Chronological summary of key environmental policies and associated programs in the Netherlands

Year	Title and Primary Goal	Relevant Programs
1984	<i>Interim Law for Restricting Pig & Poultry Farms</i> : Restricts the expansion of pigs and poultry population to 10 % of existing total.	
1987	<i>Three Phase Plan</i> <i>Phase I, 1987-90</i> : Introduced the Manure Law that sets a maximum limit on manure allowed to be produced on farms. Introduced the Soil Protection Act that sets out the regulations and standards on the handling and application of animal manure. <i>Phase II, 1991-94</i> : Targets the application, relocation and processing of manure were implemented. <i>Phase III, 1995-2000</i> : Tightens the standards set out in the previous phases	Establish manure quotas Mandatory preparation of manure balance sheet Levy on surplus manure Establish a national Manure Bank Restricts manure application Compensation to producers
1989 and 1994	<i>National Environmental Policy Plan (NEPP), NEPP2</i> : Defines a set of principles towards achieving sustainable development, including the restoration of the environment within one generation (25 years)	
1990	<i>Plan to Reduce Ammonia Emission from Agriculture</i> : Targets the reduction of ammonia emission by a minimum of 50% by the year 2000, and 80% by 2015. Base year for comparison is 1980.	
1991	<i>Directive on Ammonia and Cattle Farming (under the Nuisance Act)</i> : Restricts the expansion of cattle farms in areas where the acidification is below 30 mol acid per hectare annually	Requires cattle producers to control acidification to below limit if expansion is to occur.
1991	<i>The Multi-Year Crop Protection Plan</i> : Targets the reduction of chemical pesticides usage by 35% by 1995, and 50% by 2000	
1993	<i>Environmental Management Act (EMA)</i> : To streamline regulation and integrate decision-making policies within government.	
1995 and 1996	<i>Policy Document on Manure and Ammonia</i> : Targets the balance of input and output. Introduced the concept of Mineral Accounting, which will be compulsory for all farms by the year 2002.	Increased restrictions on manure spreading. Increased standards for manure storage, Mandatory Mineral Accounting to be phased in. Use and loss standards for manure application. Encouragement and restructuring Policy on ammonia Trial program on Integral environmental license Manure supply for non-intensive livestock farms and holdings without cattle

C. Key programs for air, water and soil

Manure from intensive livestock production has been identified as a major contributor to acidification and eutrophication. To reduce nitrate and phosphorous in water and soil, the Netherlands has developed a set of regulations targeting 'surplus manure'. Surplus manure is defined as the amount that can not be applied on farm according to legal standards. The primary objective of the Netherlands is to balance production and utilization of manure by the year 2000. This means that the total amount of nitrogen and phosphate applied in the form of manure as well as other organic nutrients and chemical fertilizer, should equal the amount absorbed by crops.

This section provides a summary of the key programs. Where possible, the effectiveness of the program and the cost are discussed.

1. Manure quotas

Each farm was given a quota for manure production. Quotas are allocated on the basis of 1986 livestock population and agricultural area. Each unit of quota allows for the production of 125 kg phosphate in manure per hectare. As of 1994, manure quotas became a tradable commodity, with some restrictions.

2. Preparation of manure balance sheet

Each farm is required to prepare a manure balance sheet, which is used to control the production and transfer of manure.

3. Levy on surplus manure

All surplus manure produced by farms is subject to a levy. The levy is NFI 0.25/kg (C\$0.19/kg) phosphate on the first 75 kg exceeding 125 kg/ha. This levy increases to NFI 0.50/kg (C\$0.38/kg), when the manure surplus exceeds 200 kg phosphate/ha. Revenues are used to finance general infrastructure facilities and research for solving the manure problem

4. Establishment of a national manure bank

Provides a distribution system for surplus manure. The bank is required to accept all surplus manure offered by producers. Producers are required to pay a fixed fee of NFI 20/m³ (C\$15.00/m³) of manure transported. This bank regulates the establishment of manure processing plants. Financing of these plants comes mainly from taxes on farmers. This specific tax is based on surplus phosphate at the farm level and differentiated by region.

5. Restrictions on manure application

Maximum application of phosphate from manure are 200 kg for grass, 250 kg for fodder maize and 125 kg per hectare for all other crops. Nitrogen discharged with the manure

can be twice as much as phosphate.

6. Restrictions on timing of manure application

Spreading is prohibited between September 1 and February 1 on land vulnerable to leaching. Manure can not be applied on frozen soils, periods of high rainfall and low evaporation periods. For uncovered fields and maize land, all animal manure must be worked into the soil within one day of application.

7. Compensation to producers

The Soil Protection Act requires provinces to designate groundwater protection areas. Regulatory measures vary depending on the proximity to the water abstraction point and soil type. These measures are imposed and usually focus on fertilizer application. Farmers adversely affected by such regulations are entitled to compensation.

8. Basic measures

Places a ban on manure spreading in autumn and winter for non-leaching-prone grassland. When manure is being applied, it requires the use of techniques that will minimize ammonia emission. Farmers are required to store manure under cover.

9. Mineral accounting

A system of accounting for all inputs and outputs of minerals on the farm. Maximum allowable loss standards were established, and if the losses exceed the standards for phosphate and nitrogen set for that year, the surplus is subject to a fine. Fines are NFL 5/kg phosphate/ha (C\$3.75/kg phosphate/ha) over the surplus for the first 10 kg, and NFL 20 (C\$15.00) for any additional surplus.

The maximum allowable amounts per hectare of grassland per year are as follows:

	<u>Nitrate</u>	<u>Phosphate</u>
1998	300 kg	40 kg
2000	275 kg	35 kg
2002	250 kg	30 kg
2005	200 kg	25 kg
2008/1010	180 kg	20 kg

Effective January 1, 1998, farms with more than 2.5 livestock units per hectare will be required to keep records of their mineral inputs and outputs. About 35% of all arable farms and 50% of the 74,000 livestock farms will be required to implement a mineral accounting system. In 2002, farms with a stocking density of 2 units per hectare will be required to undertake mineral accounting. The implementation of mineral accounting is not expected to be onerous to farmers, as they are currently required to prepare manure balance sheets.

According to government analysis, the gradual lowering of the maximum mineral loss

standards will lead to a reduction in employment and farm income. The impact on the agriculture sector will vary across commodities. It is anticipated that the income from the livestock sector will be reduced by DFL 1,000 (C\$750) by the year 2000. The hog sector will lose an average of DFL 7,000 (C\$5,251) per year. The impact on the income of the arable and poultry sectors will be minimal.

10. Use and loss standards

Use rates for manure application on grasslands were lowered from 150 to 135 kg phosphate per hectare in 1996. Effective 1998, loss standard will be lowered to 40 kg/ha phosphorous. This rate will again be lowered to 20 kg/ha by 2008-2010. For nitrogen, the loss standard for grassland will be 300 kg/ha in 1998 and 180 kg/ha in 2008-2010.

11. Encouragement and restructuring

Intensive livestock farms with small land area will eliminate their excess minerals either by selling their manure on the domestic or possibly foreign markets, or altering their livestock feed to lower mineral contents. The change in the loss and supply standards will reduce market opportunities for manure. To alleviate the pressure resulting from the mineral accounting system, the government is interested in removing 17 million kg of phosphate out of the marketplace by the year 2002. This will be achieved by removing manure quotas. In the event of a farm take-over (other than by members of the same family), half of the manure production rights will be eliminated. A relocated farm will lose 25% of its manure quota.

A restructuring fund in the amount of DFL 475.0 million (C\$356.0 million) will be set up. The fund will be used to purchase manure quotas from retiring farmers and to finance restructuring plans. Structural adjustments are expected in the hog sector. All restructuring plans will be developed in partnership with producers. This fund will be available to assist producers until the year 2002.

For the period 1995 and 2002, the government will budget DFL 140.0 million (C\$105.0 million) for an incentive program to assist producers to process manure on site, and to develop and introduce green label housing. Extension programs and demonstration projects will be set up to promote the reduction of mineral losses, and further develop best agricultural practices.

12. Policy on ammonia

Effective 1998, farmers with a stocking density of over 2 livestock units per hectare will be required to construct low emission housing.

13. Integral environmental license

On a trial basis, selected municipalities may temporarily replace the manure and ammonia regulations with an integrated environmental license. Farmers whose environmental management is in order would be granted such a license, which covers ammonia emission, manure distribution, mineral ledger and pesticide use.

14. Manure supply for non-intensive livestock farms and holdings without cattle

If no manure is produced at a farm, a maximum of 80 kg/ha of phosphate may be supplied in the form of manure and other organic fertilizers. Effective 1998, the standard for manure and other organic fertilizers will be set at 120 kg/ha of phosphate for grassland and 100 kg/ha for arable land. The same standards will be lowered to 85 kg/ha and 80 kg/ha by the years 2000 and 2002.

D. Biodiversity, nature and landscape

Conservation of biodiversity in Netherlands is largely incorporated into the nature and landscape policies and programs. The Netherlands has a long tradition in nature and landscape conservation. The first private Foundation for Nature Protection was founded in 1905. During the first half of the century, nature and landscape conservation activities focused mainly on land acquisition, setting up legal measures to protect species, and increasing public awareness through education.

Flora and fauna have been declining rapidly over the past few decades in the Netherlands. This is primarily due to the loss and fragmentation of ecosystems, acidification, desiccation and eutrophication. While agriculture is a major contributor to the decline in biodiversity, urbanization, new infrastructure, and other human activities are also responsible for the losses.

According to Umstatter and Dabbert (1996), the Dutch government has introduced a total of 36 policy instruments on nature and landscape conservation, 28 of these are concerned with nature conservation and 8 with landscape conservation. Main instruments include the Relation Paper, Nature Policy Plan of 1990, Species policy, Regulation 2078/92, and Valuable Agricultural Landscapes. In addition, the Dutch government has introduced special protection zones in accordance to the Ramsar convention, the EU Bird Directive and the EU Habitat Directive.

In the Netherlands, the implementation of EU regulation 2078/92 has focused on programs to stimulate and support organic farming, extension and demonstration projects, and for improving the environmental training of farmers.

Farmers who make their land available for recreational use (e.g. fishing, canoeing or public footpaths) can receive a single payment of DFL 3,600/ha (C\$2,700/ha). In addition, farmers who open their fields or farmyard for long distance walkers can receive a payment of DFL

2,20/m (C\$1.65/m) of footpath. The execution of the regulation is delegated to the Foundation for Long Distance Footpaths.

Since 1990, there has been an increase in the number of local initiatives by farmers to form cooperatives to enhance environmental and conservation measures. These initiatives are often given legal status. Reasons for the creation of local initiatives are: 1) growing reluctance towards government policy on environmental and conservation issues and the desire to find alternatives to the large-scale withdrawal of agricultural land for conservation purposes, 2) increasing concern for present and future incomes and the growing market for extra income from nature and landscape conservation, and 3) increasing concern about the public image of agriculture and the desire to show benefits for the countryside as well.

Many provincial governments, farmers' organizations and nature conservation organizations have become more interested in increasing the value of agricultural areas for biodiversity. Interesting discussions on the question of to what extent conservation measures should be rewarded. While it is broadly believed that the polluter pays principle should be applied to pollution, many people advocate the Stewardship Remuneration Principle for nature and landscape conservation.

The total conservation budget for 1996 was estimated at DFL 367.0 million (C\$275.0 million). About 12% of the Ministry of Agriculture, nature Management and Fisheries' total budget and about 0.2% of the total state budget. Most of the budget is allocated to land purchases for the creation of nature reserves and 'new nature' and for management measures (e.g. reserves and management agreements).

In terms of key programs, management agreements are the principal instruments used to preserve biodiversity, nature and landscape. A management agreement is a voluntary contract that defines the terms to be observed by the land-user and the government. It specifies the management practices required and the compensation. Compensation is calculated on the basis of income foregone, and additional costs that may be required to undertake the conservation practices.

About 6,000 farms currently have management agreements covering about 40,000 hectares, and about 22,000 hectares of reserve area has been acquired by the government. In addition, about 10,000 hectares of agricultural land has been acquired. This is land that will be designated as reserve areas or will be used to exchange plots in reserve areas. About 125,000 hectares of agricultural land have been designated as management or reserve areas. The target is to have a total of 200,000 hectares designated as management and reserve areas by 1998.

Management agreements are considered to be operating efficiently, and the government would like to increase the area under these agreements. It is looking at several initiatives to improve the program. One of the new initiatives being examined is the concept of paying producers for their achievements instead of just creating an environmental-friendly condition. The underlying concept is that payments will stimulate farmers' entrepreneurial qualities. They will be free to choose how they achieve nature benefits on their land.

E. Key players

Most environmental legislation and policy is implemented by the Ministry of Housing, Spatial Planning and Environment (VROM). The Ministry of Agriculture, Nature Management and Fisheries is responsible for agriculture and general nature policy, including nature conservation legislation. The Ministry of Transportation, Public Works and Water Management is responsible for traffic and transport policy and has jurisdiction over all state waters.

The National Environment Commission is composed of high level civil servants from most ministries and advises cabinet on environmental issues. In addition, various consultative councils have advisory responsibilities on environmental policy, including the Environmental Management Council and the Socio-Economic Council.

Environmental policy is formulated at the national level and implemented largely at the regional and local levels. For example, there are 120 water boards in the Netherlands, which are responsible for implementing water policies and protecting against water pollution. VROM and local government organizations agreed on a basic division of duties in 1990 and they jointly produce an annual Inter-Provincial Program which delegates specific actions. Breakdown of responsibilities for the environment is as follows:

1. Provinces

Each province is required to develop a long-term environmental plan and is responsible for the implementation of environmental laws in its jurisdictions. The province is also responsible for local municipalities and water boards.

2. Municipalities

Municipalities are not required to draw up environmental plans; however, funding is available for such plans. Each municipality is responsible for the licensing of small industrial plants, aspects of soil cleanup, and services such as sewage, refuse collection and recycling. Some smaller municipalities are coordinating efforts to provide regional environmental services.

3. Water Boards

Created in the Middle Ages, these institutions were traditionally responsible for water management in low-lying areas, primarily for protection against flooding. In the second half of this century many have taken on authority for protecting against water pollution. The water boards are governed by a committee appointed by the Crown and a council elected by local property owners.

The Netherlands requires many groups to develop industry associations with one representative to deal with the government and legislation. In the agricultural sector, there is an Agricultural Board which is a statutory Body empowered to lay down binding collective regulations. The National Agricultural Board deals with issues not handled through legislation or private farmers groups.

VII

Denmark

With 75% of the countryside in agricultural use, Danish farm structure and practices have a significant influence on the environment, including the aesthetic, ecological, and recreational qualities of the Danish landscape. The search for economies of scale has led to increased specialization in Danish agriculture industry for the past few decades. In the mid sixties, agriculture was dominated by mixed farming. About 80% of the farms had cattle and three out of four farms had both cattle and hogs. By the mid nineties, the share of farms with cattle had dropped to about 45% and only 15% of the farms are involved in mixed livestock production. Furthermore, regional specialization has led to a concentration of the dairy herd in the western parts of the country.

Combined with the structural changes in the agriculture sector are changes in farm practices. The use of fertilizer and pesticide had also grown over the decades (per hectare application of nitrogen has more than tripled since 1960 and pesticide application has doubled since the mid seventies. While there is no proven link between the use of chemical inputs and environmental damage, the large increase in the intensity of fertilizer and pesticide use has been accompanied by increasing pollution problems and a loss of biodiversity in the farmed countryside.

A combination of the EU's CAP program and significant technological advances have increased the intensity of the Danish agricultural production over the past few decades, although the CAP reform has helped decrease some of this pressure over the past few years. Intensive agricultural production, (pesticides, herbicides and fertilizer), and increased waste from hog and dairy production has led to growing public and political concern over the adverse environmental effects of agricultural practices.

A. Environmental issues

The impact of agriculture on air quality is primarily related to ammonia emissions from livestock. Ammonia emissions are a form of air pollution, which indirectly damage the aquatic environment as well as trees and certain habitats. In the mid eighties, it was estimated that agricultural production was responsible for 70% of total ammonia emissions in Denmark. Ammonia emissions were particularly high in the western parts of the country where there is a high concentration of livestock and manure.

On the water and soil side, the major issues include the rising content of nitrate in ground and surface water, the eutrophication of marine waters, and the side effects of pesticides on flora and fauna. The alteration of the rural landscape caused by modern farming (e.g. drainage and cultivation of wetland, infilling of ponds, and removal of hedgerows) is also another major environmental concern.

B. Overview of environmental policies and programs

Prior to 1984, the agricultural sector was not considered to be an important source of pollution. However, several incidents of oxygen deficiency in open marine waters in the early eighties, and a growing recognition of a link between this phenomenon and nitrate leaching from agricultural land, has brought this sector under scrutiny.

In 1985, the Ministry of Environment presented the first NPO Action Plan, to reduce the pollution of nitrogen, phosphorus and organic substances into the aquatic environment. Two years later, this plan was replaced by a more comprehensive plan known as the Aquatic Environment Action Programme, which placed a number of restrictions on manure application and storage. The Aquatic Environment Action Programme and the Action Plan for Sustainable Agriculture represent the cornerstone of Danish agri-environmental policy.

The recognition of agriculture's potential impact on the environment evolved during a review of several subsidy programs in the eighties. This review led to the removal of drainage and irrigation subsidies. The drainage subsidies were abolished in 1987 to reduce economic incentives to reclaim marginal land and habitats. Subsidies for irrigation were abolished in 1983 to reduce damage that could be caused by drawing the water table down and drying out wetland and watercourses.

Exhibit VII-1 provides a chronological summary of the key policies and associated programs specific to air, soil and water issues.

Exhibit VII-1

Chronological summary of key environmental policies and associated programs in Denmark

Year	Title and primary goals	
1986	<i>Action Plan to Reduce Pesticide Application:</i> The plan calls for a reduction of total pesticide application by 25% of the 1981-85 average by 1990 and 50% by 1997.	Mandatory pesticide application training for farmers.
1987	An Act to prevent the continued use of pesticides that are significantly toxic, carcinogenic, highly mobile in soil, slowly decaying or liable of causing embryogenic or genetic changes.	Re-registration of pesticides licensed before 1980.
1987	<i>Aquatic Environment Programme:</i> Protect the environment from nutrient pollution. Specifically for agriculture, the Program calls for the elimination of run-off from animal manure and silage storage, and reduction of nitrogen loss by 50%.	Mandatory storage for manure:
1987	<i>Act on Organic Farming (updated several times):</i> Promotes and sets standards for organic farming.	Organic conversion grants.
1990	An Act to reduce air pollution and prevent damage to hedgerows, woods and other habitats, straw burning is banned effective 1990.	No straw burning.
1991	<i>Action Plan for a Sustainable Agriculture (supplement to the Aquatic Environment Programme):</i> Targets the reduction of nitrogen and phosphorus pollution from agriculture	Increase manure storage requirements. assistance to farmers reducing N fertilizer levels (EU Regulation 2078/92) Other nutrient pollution provisions.
1993	Act implementing the accompanying measures of the 1992 CAP reform	Compensatory programs for specific voluntary measures, such as preservation of extensive grass area and long term fallow.
1996	<i>Eco-Tax on Pesticides:</i> Strengthen the incentives for farmers to reduce the use of pesticides and insecticides. Effective January, 1996, a 37% tax was placed on insecticides and 15% on herbicides, fungicides and growth regulation products.	

In accordance to the EU's Structural Policies, 4% of the agricultural area in Denmark has been designated as Environmentally Sensitive Areas. Management agreements have been arranged for one quarter of these areas. The main objective is to encourage extensive land use, primarily grazing. In general, the arrangement is considered to be quite successful. Legislation allows for the following policy instruments to be used: 1) management agreements, 2) public afforestation projects, and 3) subsidization of environmentally beneficial practices. Also, organic farming is officially promoted in Denmark through subsidies.

All of Denmark has been identified as vulnerable to nitrate pollution from agriculture in response to EU's Nitrate Directive. Denmark has already implemented or accepted most of the restrictions laid down in the Directive. It is anticipated that the Directive will have limited effect on Denmark. The rule of a maximum application of nitrogen in animal manure to 170 kg/ha is expected to be the most challenging. However, this limit is fairly close to the present Danish standard.

Danish nitrate policy applies to the whole country because eutrophication in marine waters is a major concern. Danish policy was based on the assumption that research and development, combined with extension services, would be able to redirect farm practices towards lower nitrate emissions. While management practices have improved the situation, empirical evidence suggests the problem continues. Economic measures providing autonomous incentives for regulating pollution have not been widely used. Subsidies are given to compulsory investments in manure storage facilities and to some forms of environmentally beneficial practices.

The recent introduction of an eco-tax may signal an increasing political willingness to use the Polluter-Pays-Principle, instead of strengthening bureaucratic control over farmers.

C. Key programs for air, water and soil

1. Pesticide application provisions

Mandatory education of farmers using spraying equipment and mandatory pesticide application bookkeeping. Provided support to ray grass as a nitrogen catch crop in cereals (EU Regulation 2078/92).

2. Re-registration of pesticides

Re-register all pesticides licensed before 1980.

3. Storage for manure

Requires farmers to have 6 to 9 months of storage capacity for animal manure before 1993. Farm organizations estimated investments in storage facilities to be about Dkr2 billion (C\$0.5 billion) by 1990. Another Dkr1 billion is anticipated before 1993. Investment per farm averaged Dkr140,000 (C\$31,780). (Duggard, 1991)

Farmers are offered a subsidy equivalent to about 30% of the costs of upgrading the storage facilities to the required capacity.

4. Application of manure

Limits the amount of nitrogen from manure that could be applied on a per hectare basis.

Liquid manure is required to be worked into soil 12 hours after application. Prohibits the spreading of liquid manure on frozen ground and on bare soil during autumn harvest until November 1.

5. Fertilizer management plan

Farms with 10 or more hectares are required to prepare fertilizer management plans.

6. Autumn crop cover

To reduce nitrate leaching from bare soil during autumn and winter, farmers are required to plant cover crops. As of 1990, autumn crop cover is required on 65% of the cultivated area. Original estimates for the autumn crop cover requirement was Dkr200 million/hr (C\$45.4 million/yr). However, most of the farms met their requirement by incorporating it into their winter crop rotation. This method of compliance resulted in minimal costs to farmers.

7. Organic conversion grants

Currently, farmers converting to organic production are eligible to receive Dkr 2,000/ha (C\$454/ha) for the first two years. In the third year, the grant will be reduced to Dkr 800/ha (C\$181/ha). These rates target arable farmers, but hog producers will be able to take advantage of them. Estimates for 1996 suggest that about 2% of agricultural area in Denmark had been converted to organic farming, or was in a conversion program. Dairy production is the principal enterprise on most of the organic farms and two thirds of the area is used for grass and green fodder.

8. Manure storage requirements

Requires producers to have a minimum storage capacity of about nine months. Liquid manure is stored in tanks of impermeable material. Solid manure and silage on basis of impermeable material with run-off to storage tank. The increase in minimum storage capacity from six to nine months requires additional investment for producers. The impermeable requirement for storage could add additional costs.

9. Manure application standards

A ban was placed on autumn and winter spreading of liquid manure. Minimum utilization rates introduced for nitrogen content in manure, to be effective 1997.

10. Fertilizer intensity

Mandatory nutrient bookkeeping and control are required. Total nitrogen use can not exceed economically optimal N-rates. This program sets limit on nitrogen content in manure, and provides support to farmers reducing N fertilizer levels (EU Regulation 2078/92). It also limits pig slurry to 50%, cattle slurry to 45% and other animal waste to

40%.

11. Other nutrient pollution provisions

An autumn crop cover is required on at least 65% of cultivated area, and two meter filter strips must be maintained alongside water courses and lakes. Nitrogen content in manure is limited to 180 kg/ha on hog farms and 240 kg/ha on cattle farms.

Voluntary measures include:

- Subsidies for a 40% reduction of standard application rates of nitrogen fertilizers. Current subsidy rate on nitrogen fertilizer application rate is Dkr400-Dkr750/ha (C\$91-C\$170/ha).
- Subsidies for belts along sensitive areas such as lakes and waterways where spraying of pesticides is prohibited. Current subsidy rate for non spraying belts is Dkr1500/ha (C\$341/ha).
- Subsidies for extensive grass areas. Subsidy for converting to extensive grass is Dkr615 - Dkr1915/ha (C\$140 - C\$435/ha), and Dkr400- Dkr900/ha (C\$91 - C\$204/ha) for maintenance.
- Subsidies for long-term fallow areas (20 years): Long-term fallow subsidies is Dkr1915/ha (C\$435/ha).

For designated protection zones, an extra premium can be obtained.

12. Eco-tax on pesticides

Strengthen the incentives for farmers to reduce the use of pesticides and insecticides. Effective January, 1996, a 37% tax was placed on insecticides and 15% on herbicides, fungicides and growth regulation products. Previous measures used to curtail pesticide use has failed to attain the targeted reductions. The new levy is added at the retail level. Tax revenues will be remitted to the farming sector in the form of a reduction in land taxes.

D. Biodiversity, nature and landscape

Denmark has a long history of nature and landscape conservation. It started with an ordinance to protect forests and woodlands from conversion to other uses in 1805. The first Act on nature and landscape conservation was passed in 1917. This Act allowed conservation orders to be imposed on specifically designated areas, with compensation to land owners for economic losses.

In the sixties, a regulation was introduced to classify all land as urban or rural. Rural land was protected from urban development. Since the mid eighties, landscape policies have taken on a

more proactive approach. New legislation allows state acquisition of land for afforestation and nature restoration, and support programs have been implemented to promote private afforestation and landscape management. Furthermore, the legislation allows for expropriation.

Conservation orders and management directions can be imposed on specifically designated areas of particular scenic or ecological importance, and on species of plants and animals. Landowners are compensated for losses incurred, as a result of conservation restrictions and public access rights imposed on their property. Since the 1917 Act was passed, 5% of Danish land area has come under a conservation order.

The Nature Protection Act of 1983 includes general provisions to protect nature areas and habitats in agricultural areas from intensification or elimination. Subsequent revisions of this legislation allow for small nature areas and habitats to be protected, including 1) heaths, bogs, salt marshes, meadows, semi-natural pastures larger than 0.25 ha, 2) ponds and lakes larger than 0.01 ha, 3) mandatory two meter wide uncultivated zones alongside watercourses. However, many farmers see this as an infringement on their property rights since they are not offered compensation, and an estimated 30-50% of affected farmers have not complied with the requirement. An estimated 250,000 ha of heaths, bogs, salt marshes, meadows, and semi-natural dry pastures have been protected as of 1995. (Umstatter and Dabbert, 1996).

In the mid eighties, anticipating changes to the CAP program, a new nature and landscape policy was introduced, **Nature Management Act** of 1989. This Act was passed concurrently with the introduction of Environmental Sensitive Areas by the EC. The main objectives of the legislation are to:

- maintain and improve landscape amenity
- enhance wildlife
- increase forested area by afforestation of marginal agricultural land
- improve recreational opportunities.

The legislation is implemented through land acquisitions, management agreements with land owners, public afforestation projects and, subsidies to favourable environmental practices.

On the biodiversity side, the 1979 EU Bird Protection Directive resulted in the designation of 9,600 km² as bird protection areas. While salt and brackish water bodies comprise 75% of the designated area, considerable agricultural land is also included.

E. Key players

Due to the relative importance of agriculture in the Danish economy, agricultural organizations have traditionally held an influential position in the Danish political system. When the environmental problems in agriculture became a public and political issue in the mid eighties, the agricultural organizations appeared to be taken by surprise. The initial reaction was denial, but this attitude has gradually changed over the last few years and they have been a more constructive participant. The Danish Society for the Conservation of Nature is by far the largest and most influential organization. The Ministry of Agriculture generally prefers a voluntary approach to environmental problems associated with agricultural practices. The Ministry of Environment does not share the same view and it recommends economic and statutory measures to combat agricultural pollution.

VIII

France

France has a total area of 547,000 square kilometres and a population of over 58 million. This results in a population density slightly higher than 100 people per square kilometre, which is less than one-third of that in the Netherlands. France is divided into 22 administrative Regions and 95 Departments, which are further divided into a large number of smaller administrative units (municipalities). The legislative branch of government includes the Senate and the National Assembly. In general, there is considerable, but diminishing, state control over its market economy. France has substantial agricultural resources and it has been a leading agricultural producer in western Europe (major exporter of wheat and dairy products). The agricultural industry contributes approximately 2% of national gross domestic product.

As in many countries, the industrialization of France has involved large-scale urbanization, which has been accompanied by a significant population shift away from rural areas, including the mountain areas. This has resulted in a land-use balance issue in France, since 20% of its land area is now occupied by approximately 80% of its population. Environmental issues in France include some forest damage from acid rain, air pollution from industrial and vehicle emissions, and water pollution from both urban and agricultural sources, including runoff. Some areas in France are subject to flooding.

A. Environmental issues

Current key environmental issues include:

1. Water quality

Unlike many countries, France has an abundant supply of fresh water; however, this supply is fragile and not equally distributed within the country. France places a high priority on its clean water policy and over \$16.5 billion has been allocated for the 1992-96 period. The overall goal is to restore the quality of its waterways and significant progress has been made over the last 20 years. In France, the management of surface and ground water is considered to be a "national common heritage", and is based on six important fundamental principles, including: the geographical reality of large river basins, the benefits of an integrated approach, the establishment of partnerships and the coordination of public authorities, the mobilization of specific financial resources, multinational planning, and the respect for the competence of each private and public contracting authority in its specific sphere. It is important to note that ground water has been polluted in regions where there is intensive agriculture. There are national policies aimed at

mobilizing farmers and challenging practices such as improper spreading of liquid hog manure and excessive fertilizer applications.

2. Protection of nature and landscape

France has an extremely diverse natural environment, which is reflected in its wealth of flora and fauna. Laws have protected nature in France since 1976. Since 1982, more than 14,000 acres have been classified as natural zones of ecological interest. In response to the EU "habitat directive", France is completing its first census of its resources. The most crucial problem for the future concerns the countryside, given the effects the rural exodus has had on the maintenance of traditional rural landscapes.

B. Overview of environmental policies and programs

In general, France has a relatively complete set of laws and regulations pertaining to the environment. This legislative situation was further enhanced in March 1993, when an inter-ministerial committee for the environment was established to promote environmental protection policies within all services of the state, thus representing a national, cross-sector approach to environmental awareness and strategy. In addition, there have been 26 regional environmental boards, including four in the overseas departments, which act as intermediaries in environmental discussions at the local level.

With strong local and volunteer support, the Ministry of the Environment can place a high priority on the prevention of damage, rather than repairing environmental damage (over 40,000 associations have been created in the last 15 years). Based on the decree of July 7, 1977, duly recognized associations are considered to be official partners in government policy and dialogue between all parties has improved considerably over the past two decades.

A summary of key environmental events is provided in Exhibit VIII-1.

Exhibit VIII-1:**Chronological summary of key environmental events in France**

Year	Title and Primary Goal	Relevant Programs
1964	Water Law adopted which included financial incentives, based on the principle that the "polluter must pay". The 1992-96 programme takes agricultural pollution into account.	Established Water Agencies in the six river basins.
1971	France one of first countries to establish a ministry for the protection of nature and the environment (originally responsible for coordinating the work of other ministries)	
1976	Act on Classified Installations for Environmental Protection	Revised in 1992
1982-83	Decentralized laws limited the role of the State to water law enforcement, and to guarantee public health and safety (water supply services are controlled by the territorial administration of the State)	
1990	Separate bodies brought under the Agency for the Environment and for Energy Development (ADEME). At the end of 1990, the first national plan for the environment was approved by government.	
1991	In recognition of the need to adopt clean technology, the label "NF Environment" was introduced and is awarded to products which respect environmental standards, taking into consideration the whole production process starting with raw materials.	
1992	The EC Nitrate Directive was incorporated into French legislation	
1992	Act had a broad scope and deals with protection of health, agriculture, environment and the conservation of sites. Livestock breeding enterprises are classified and are either "reporting" or "authorization"	Act on Classified Installations (see above)
1992	Act is the basis for water regulation. Six major independent hydrographical networks impose regulations and management schemes for protection purposes. Severe civil and criminal penalties under act	Water Act
1993	Initial law related to the protection and development of scenery was viewed as a basis for an overall approach to protecting the landscape.	Law on Landscape Protection and Enhancement
1994	Reduction of pollution from agriculture, especially nitrates and phosphates entering water systems	Agricultural Pollution Control Program

C. Key programs for air, water and soil

From an agricultural soil and water perspective, nitrates represent the single largest concern and this issue has received much attention since the 1970s. In general, the French nitrate policy is carried out within its general environmental and agricultural policies, national legislation on nitrate pollution, and within regulations at the level of Departments and Communes.⁶ In France, three types of policies are important at the national level: (1) land use planning (establish general rules for land utilization and zoning operates as a constraint on the existing farm structures), (2) water protection legislation, and (3) a scheme for classifying intensive livestock producers.

In 1991, the French government introduced a tax on nitrogen emissions from manure originating from intensive livestock farms. In principle, this tax was intended to be charged on the amount of nitrogen, which supposedly is leached to the aquatic environment. Due to strong protests, the introduction of this scheme was delayed until 1993, when an agreement was reached between the Ministry of Agriculture, the Ministry of Environment, and the farmers' union. This agreement stipulated a phased-in approach from 1994 to 1998 (with some regional exceptions). Farmers can obtain financial assistance to meet standards until 1998, with total costs being shared equally by the State, the water authorities, and the farmers. Requirements in France can involve the following:

- environmental approval for large livestock farms;
- termination of run-off and leaching from manure and silage storage facilities;
- regulations requiring adequate manure storage (e.g. six months);
- restrictions on the amount of nitrogen which may be applied per hectare;
- restrictions on spreading animal manure; and
- the preparation of nitrogen balance sheets.

In 1992, the EC Nitrate Directive was incorporated into French legislation. In France, the designation of vulnerable zones is based on an analysis of the nitrate content in aquifers (concentration above 50 mg/litre). This means that large areas of France will be classified as vulnerable. Codes of good agricultural practice have been introduced in France, but at varying rates. In regions with intensive animal production, the restriction on applying nitrogen in manure at 170 kg/ha could be difficult, if not impossible, to comply with. As indicated by Rude, the impact of the EC Nitrate Directive on agriculture will vary across France. This will be due to differences among Departments on nitrate policies, the structure of the industry and natural conditions.

In terms of the design and implementation of agricultural legislation and programs, the

⁶ S. Rude and B. Frederiksen. "National and EC Nitrate Policies-Agricultural Aspects for 7 EC Countries", Report No. 77, 1994.

Federation Nationale des Syndicats d'Exploitants Agricoles (FNSEA), has a very active role with government, given that it is the main farming union in France.

In relation to general water issues, France has had a very serious and integrated approach for many years. As indicated above, the management of surface and ground water is based on a number of fundamental principles, and water policy is defined by the State, in partnership with all local communities and users. Dialogue is institutionalized at three levels: (1) the National Water Committee, (2) the River Basin Committee, and (3) the local Water Commission. Within the Water Law of 1964, a Water Agency was set up in each of the six river basins as an administrative public establishment. It is important to note that the Agencies' VIth Action Programme (1992-96) accounted for agriculture pollution.

D. Biodiversity, nature and landscape

Landscape issues in France are largely addressed under three different laws: (1) the nature protection law, (2) the law on landscape protection and enhancement, and (3) the law on enhanced environmental protection. In addition to French law, in 1975 the European community adopted a common policy for mountain and hill farming, and for farming in certain less-favoured areas. The explicit objectives in the EU policy was "to ensure the continuation of farming, thereby maintaining a minimum population level or conserving the countryside" (Council Directive 75/268/EEC). In France, mountain areas are defined according to EU criteria (essentially altitude and slope) and currently account for 23% of the land area.⁷

Sustainable development plans (known by their French acronym as PDDs), have been used in France, following an initial feasibility study conducted by the government in 1992. The purpose of this initiative was to test a new type of agreement, which recognizes that farmers fulfill three critical functions: (1) the production of goods and services (food and non-food), (2) the management of the environment, and (3) the promotion of rural development. In the past two years, 1,200 farmers across 59 regions have attempted to define the future of their system of farming. By 1997 it is expected that 800 plans will be covered by farmers' contracts with central government, and in some cases, other authorities. The contract provides the basis upon which the farmer undertakes the management of the farm, and this is supported by two forms of support: (1) one-off grants for taking part in the initiative, and (2) vouchers for technical assistance. Farmers participating in the initiative can also qualify for agri-environmental assistance regardless of location, provided they meet the relevant conditions. Specific proposal actions can involve landscape issues, such as planting hedgerows around grassland, and erosion control.

⁷ D. Gagey, P. Rainelli. "France: The Value of Aid To Mountain And Hill Farming From The Standpoint of Balanced Land-Use Planning And Development".

IX

Australia

Australia is a dry continent with extensive areas of infertile soils and high climatic variability. About 6% of the land is arable and rangelands cover approximately 75% of the country. While cities and towns occupy less than 1% of the continent, urban areas are concentrated in important catchments and often on high-value agricultural land

A. Environmental issues

Australia faces a number of environmental issues including soil erosion from overgrazing, soil salinity, desertification, and loss of habitats due to land clearing as well as industrial development and urbanization. This section highlights the major issues specific to air, water, soil, and biodiversity.

1. Air Quality

Greenhouse gas emissions is an important environmental concern in Australia. According to government documents, about 40% of Australia's net greenhouse gas emissions were derived from forestry, changing land use patterns, and agriculture in 1990. Clearing of native vegetation is the largest contributor to greenhouse gas emissions. The National Greenhouse Gas Inventory estimates that land clearing in Australia totals 500,000 to 600,000 hectares per year.

In a recent press release, the government announced that Australia's net greenhouse gas emissions in 1995 totaled 402 million tonnes, measured as carbon dioxide equivalent, which was a 6% increase from 1990. Detailed national greenhouse gas inventory figures in 1995 show that agriculture's emissions, including those from livestock, fell 2% from 1990 to 82 million tonnes. Forestry sector emissions comprising managed forest, plantation and revegetation activities provided a net sink of 28 million tonnes, which was a 6% reduction.

2. Water quality

About 80% of Australia's population is either totally dependent or highly dependent on groundwater. Hence, salinity and contamination of groundwater are major concerns in Australia. The concern for contamination resulting from dissolved solids, metals, pesticides and nitrates is highest in New South Wales, where agriculture and mining are important industries.

Salinity is a major concern in the State of Victoria, where considerable variations exist in the depth of the different aquifers. The direction of groundwater flow in most Victorian groundwater basins is towards the sea. However, in the Murray Basin, groundwater flows inland toward the Murray River and into the central-west of the Basin. Salt is naturally contained in the soil and the groundwater of the Murray Basin. Salt and water can not escape readily from the Basin, except via the Murray River. As a result, salt has accumulated underground. Rising watertables bring these dissolved salts to the surface. For agriculture, this is an important issue as the Murray Basin contains a high proportion of agriculture activities. Initiatives targeting this and other environmental problems have been implemented in the Murray Basin over the past years.

Periodic droughts in various regions of Australia have caused water shortages and land degradation. This natural phenomena, combined with the need for irrigation in certain regions, makes water resource management an important issue in Australia.

3. Soil conservation

According to the State of the Environment report, most areas of cropland and improved pasture are affected by soil degradation. This degradation is largely caused by a decline in soil structure, water logging and salinity, water and wind erosion, inappropriate soil nutrient balance, and soil acidification. The Australian Bureau of Agricultural and Resource Economics reports that 60% of the farmers it surveyed have a significant land degradation problem.

Changes in soil structure caused by land use may be one of Australia's most serious forms of land degradation; however, the extent, severity and cost have not been well documented. Occasional destructive storms have caused major soil loss even in mild rainfall zones of southern Australia. The most critical factor in protection soils from accelerated erosion by water is maintenance of a cover on the soil surface. In an average year, about 14 billion tonnes of soil are moved by sheet and rill erosion. This is about 19% of the total soil moved each year globally, even though Australia is only 5% of the world's land area.

Land clearing for agricultural purposes has also caused land degradation. This activity has opened land resources to damage by erosion, destroyed soil structure, changed soil chemistry and causing loss of biodiversity and other problems. In some wheat-growing regions, such as south-west Australia, the wheatbelt of South Australia and the wheat belt of central New South Wales, expansion and intensification of cropping activities have resulted in major changes to land cover. Less than 20% of the native vegetation remains in these regions.

Overgrazing of rangelands represents another issue in Australia. An estimated 2% of the rangelands is classified as severely degraded, and 15% is sufficiently affected to require destocking if it is to recover. However, surveys conducted on more than 51% of the rangelands, which includes most of the pastoral lands, indicate that most of the land is in fair to good condition.

An estimated 29 million hectares of land, which is mainly agricultural land, are considered to be significantly acidified, at least in the surface layers. While soil acidification can be remedied by applying lime or dolomite as sources of alkaline materials, recent estimates in South Australia suggest that only about 10% of the area requiring lime received applications during the past ten years.

Vertebrate and invertebrate pests represent another serious problem in Australia. Since European settlement, more than 1900 plant species have become naturalized (e.g. plants that have been deliberately introduced or accidentally released). About half of these plants are regarded as weeds, and potential weeds are still being introduced. Weeds tend to reduce farm and forest productivity, displace native species and contribute significantly to land degradation. Weeds are estimated to cost Australia about A\$3.3 billion (C\$3.4 billion) annually. Insects cause annual losses to primary production of about A\$3.1 billion (C\$3.2 billion). The cost of controlling all pests exceeds A\$1.0 billion (C\$1.0 billion) annually, mostly due to expenditure on chemical products.

At the national level, there is limited information concerning the amount of pesticide and herbicide being released by the agricultural sector. The only information available is that farming systems using minimum tillage or conservation practices are relying on agricultural chemicals much more heavily than traditional systems.

4. Biodiversity

In its recent State of the Environment report, Australia considers the loss of biological diversity to be one of its most serious environmental problems. Destruction of habitats is the major cause of the loss in biodiversity. The destruction has and continues to occur on wetland, saltmarshes, mangroves, bushlands, inland creeks and estuaries.

The most significant impediment to the conservation and management of biodiversity is a lack of knowledge concerning what biodiversity consists of and how it is distributed. Australia is home to more than one million species, but less than 15% have been described. For those terrestrial groups for which there is sufficient information to assess current state, the trends are disturbing (Press Release, 1997).

Habitat modification, particularly removal of native vegetation for agriculture, urban development and forestry, continues to be a major reason for loss of biodiversity. Australia has lost an estimated 75% of its rainforests, and about 40% of its total forest area, since the European settlement. Nearly 70% of all native vegetation has been removed or significantly modified, and land clearance has accelerated over time.

Native vegetation is still being cleared at a rate of over 600,000 hectares per year, almost half the rate for clearing in the Brazilian rainforest in 1990-91. Most of this is taking place in Queensland and New South Wales (Press Release, 1997).

Degradation and loss of wetland, riverine and water quality is another reason for the change in biodiversity. Grazing in arid and semi-arid regions, and introduction of exotic

plant species and mammals are also causing losses in biodiversity.

An estimated 50% of Australia's wetlands have been converted to other uses. In some regions, the rate of loss is higher (e.g. on the Swan Coastal Plain of Western Australia 75% of the wetland have been filled or drained). Historically, agricultural development has involved substantial loss of wetland on the floodplain of coastal rivers. Drainage and conversion of wetland for agricultural activities has been a major cause of wetland loss in Australia.

B. Overview of policies and programs

Australia introduced a number of broad Acts during the seventies and eighties. These include the Captains Flat Act (Abatement of Pollution), the Environment Protection Act (Impact of Proposals), and States Grant Act (Nature Conservation) Act.

One of the earliest and important environmental initiatives was the Murray-Darling Basin Initiative (MDBI), which was established in 1985. This initiative represents a partnership between the Commonwealth and the four States that occupy the Murray-Darling Basin (New South Wales, Victoria, South Australia and Queensland). Under this initiative, governments and communities work together to implement natural resource management policies, strategies and programs targeting the improvement and maintenance of water quality. It also aimed to control and prevent land degradation, rehabilitation of land resources, and conservation of the natural environment of the Basin, including the preservation of sensitive ecosystems. The MDBI consists of two main programs, the Basin Sustainability Program and the Water Business Program (see the next section for a summary of the programs).

Between 1983 and 1992, another major environmental program was the National Soil Conservation Program (NSCP). The goal of this program was to develop and implement national policies for the rehabilitation and sustainable use of the nation's soil and land resources.

In the later eighties, the NSCP was used to fund community landcare groups. Landcare is a term originally used by a Victorian State Government program to establish voluntary land conservation groups. The popularity of landcare exploded into a national movement in the late eighties and continues to strengthen in the nineties.

In the early nineties, the Australian government undertook a number of major consultative processes, which led to the development of some important environmental strategies and policies. These included the Decade of Landcare Plan, the National Strategy for Ecologically Sustainable Development (NSED), the National Greenhouse Response Strategy, the National Strategy for Rangelands Management, the National Water Quality Management Strategy, and the National Strategy for the conservation of Australia's Biological Diversity. In addition, the Intergovernmental Agreement on the Environment (IGAE) was signed in 1992. This Agreement established the roles of the various levels of government, and a set of principles to guide future development of policies and cooperative arrangements.

The 1991 **Decade of Landcare Plan** is a ten-year plan designed to assist landowners to acquire the necessary information and skills for managing their resources in a sustainable manner. Research and development are encouraged under this plan.

The 1992 **National Strategy for Ecologically Sustainable Development (NSED)** sets the goals and principles for future direction and approach to protecting the environment. Specifically, the core objectives of this strategy are: 1) enhance individual and community well-being and welfare, 2) provide for equity within and between generations, and 3) protect biological diversity and maintain essential ecological processes and life-support systems.

Since NSED was put in place, all national policies and programs have been developed within this framework. Businesses, unions and community groups are encouraged to use the NSED strategy as a basis for actions contributing to the pursuit of Australia's national goal for ecologically sustainable development.

NSED identifies challenges for specific sectors and sets strategic approaches to meet these challenges. Agriculture, biological diversity, nature conservation systems, native vegetation, environmental protection, land use planning and decision making, natural resource and environment information, environmental impact assessment, water resource management, pricing and taxation are some of the sectors included in NSED. Appendix B provides a detail description of this strategy.

In 1992, the **National Greenhouse Response Strategy** was released. The Strategy builds on previous work such as the Energy and the Greenhouse Effect document released in June 1990 and Towards a National Greenhouse Strategy for Australia in 1990. The goals of this strategy are to limit greenhouse gas emissions, enhance greenhouse gas sinks, improve knowledge and understanding of the enhanced greenhouse effect, and to prepare for potential impacts of climate change in Australia. Specific to agriculture, this strategy seeks to encourage measures to improve soil and pasture fertility and stability, reduce water pollution, improve the efficient use of fossil fuels and fertilizers, and take measures to sustain the agricultural sector. It also targets measures that would lead to a reduction in the production of methane, and to protect and enhance greenhouse gas sinks.

A follow-up to the National Greenhouse Response Strategy was the **Greenhouse 21C-Expanding the National Greenhouse Response Strategy**. This initiative differs from the previous document in that it advocates specific methods to address environmental issues, and provides funding for various activities, including partnerships between government and industry through cooperative agreements. It also supports renewable energy through industry development programs.

Greenhouse 21C has four components: Energy 21C, Urban 21C, Biosphere 21C, and Global 21C. In addition, it also has the Greenhouse Partnership 21C. Partnership initiatives include cooperative agreements with industry, development of a greenhouse information network, best environmental practice by the government, annual reporting on greenhouse response progress (as of 1996, the Minister of Environment reports annually on the progress of greenhouse response measures), and continue cooperative action with States, Territories and local governments.

Under **Biosphere 21C**, there is greater recognition of greenhouse issues in landcare and forest policies. To achieve this, the government will expand the One billion Trees program, labour market programs for expanded tree planting, and cooperative action with the States to monitor land clearance.

The government has committed A\$9.7 million (C\$10 million) over four years to facilitate the establishment or cooperative agreements with industry to reduce greenhouse gas emissions. Funding will support government activities in negotiation, technical support for implementing new technologies and best greenhouse practice and monitoring of progress.

The Commonwealth and State governments agreed to a **National Drought Policy** in 1992. The objective of this policy is to encourage farmers and other sectors of rural Australia to adopt self-reliant approaches to manage risks associated with climatic variability. Measures such as the Income Equalization Deposit scheme, the Farm Management Bond Scheme, and the Rural Adjustment scheme were introduced to assist farmers manage risk. Prior to 1990, drought was defined as a natural disaster and was entitled to relief through subsidies on farm inputs under the Natural Disaster Relief Assistance Program. These assistance measures distorted farm input markets and impacted negatively on farmers not receiving subsidies. Furthermore, these subsidies worked as disincentives for farmers to plan and prepare for drought.

To address issues and problems specific to water management and related natural resource base, a **water reform policy** was put in place in 1994. This policy document identifies several causes of inefficient resource use and environmental degradation. These include inefficient pricing policies, impediments to the transfer of irrigation from relatively low value uses (e.g. broadacre production) to high value uses (e.g. horticulture and dairy), inadequate service delivery, and unclear roles and responsibilities among institutions involved in water resource management.

The water reform policy requires users to pay the full cost of water and water services, and that future investments be governed by economic viability and ecological sustainability. The reforms also recognize the environment as a legitimate user of water, and clarified roles and responsibilities for relevant institutions. The changes resulting from this policy are extensive and are deemed to have far reaching consequences. As a result, a five to eight year (target 2001) implementation period has been set. Implementation at the ground level is encouraged and supported by the National Landcare Program, (NLP), which was established in 1992, as an umbrella program to bring together a number of programs. Since its inception, several new programs have been developed under the NLP.

In 1996, the government of Australia established the Natural Heritage Trust. This trust provides for the conservation, sustainable use and repair of Australia's natural environment. This trust has a total of A\$1.1 billion (C\$1.1 billion), and A\$800.0 million (C\$ 822.0 million) will be used to fund a range of initiatives over a five-year period. Initiatives supported by the Trust will include the National Landcare Program, the Murray-Darling 2001 initiative, the National Rivercare initiative, the National Reserve System, and the National Land and Water Resources Audit.

C. Key programs for air, water and soil

The major programs available to individual producers and rural communities for improving air quality, water quality, and soil conservation are summarized below.

1. Land related programs

a) National Landcare Program

Provides assistance to communities taking collective actions to manage the environment and natural resources, in partnership with government. There are more than 4,250 landcare groups across Australia. About one third of all farmers are members of a landcare group.

There are three components to the program: local action component, State/Territory component and national component. The local action component aims to encourage community groups and landholders to identify and solve shared problems relating to soil, water, vegetation management, and nature conservation. Grants help groups with planning, education and training, resource inventory, on ground actions, trials and demonstrations, monitoring resource condition and project support.

Community based activities which take place in the Murray-Darling Basin will be funded through the Murray-Darling 2001 initiative. Community based activities which form part of the Murray-Darling Basin NRMS are supported by the Integrated Catchment Management Program of the Murray-Darling Basin Commission

The State/Territory component consists primarily of partnership agreements between the Commonwealth and the States and Territories. These agreements target initiatives that are best undertaken on a state-wide basis or are based around partnership investments involving both the Commonwealth and State/Territory governments.

The NLP Partnership agreements set out the basis on which the National and the States and Territories will work together, and with the community. Partnership agreements can focus on sustainable land management, improved water supply and waste water management, healthy catchments and regions, developing new land and water management technologies, rangeland management and community landcare.

In 1997-98, NLP will receive A\$87.4 million (C\$89.3 million), an increase of A\$26.0 million (C\$26.6 million) over the previous year. Some A\$35.0 million (C\$35.8 million) will come from the Natural Heritage Trust.

b) National Feral Animal Control Strategy (NFACS)

This strategy is being developed to reduce the damage feral animals can cause to

agriculture and the environment by encouraging more efficient and better coordinated control practices. The long-term benefits of such a strategy include improved farm productivity and more sustainable land management practices. State, Territory and local governments will be involved in the development and implementation of NFACS since effective and efficient control of feral animals requires management of problems at the regional level, as well as commitment from all landholders.

A total of A\$16.0 million (C\$16.4 million) will be made available over six years through the National Heritage Trust. The allocation for 1997-98 is A\$3.7 million (C\$3.8 million).

c) National Weeds Strategy (NWS)

The objectives of this program are to enhance the capacity of States, local government and landholders to manage the impact of weeds on the natural environment, and increase agricultural production through the implementation of key activities of the NWS. Funding priorities include the identification and assessment of the impact of existing weeds, integration and coordination of actions against weeds, strategic control plans, research into biological control agents, integrated weed management programs, and the development of strategies to identify and manage plants with the potential to become weeds. All of the projects must target nationally significant weed species. A list of these weed species is being prepared in consultation with States, scientists and other stakeholder.

Primary responsibility for weed control will remain with landholders, State and local governments. This strategy is endorsed by State and Territory governments, and is expected to reduce the impact of weeds on Australia's primary production and natural ecosystems.

A total of A\$24.0 million (C\$24.7 million) will be made available over six years through the Natural Heritage Trust. In 1997-98, a total of A\$3.1 million (C\$3.2 million) will be available for this program.

Weed control activity may be eligible for funding through the National Vegetation Initiative, the National Rivercare Initiative, the National Landcare Program, Murray-Darling 2001 and some biodiversity and coastal programs. To be eligible under these programs, the weed control activity must be an element of a broader strategy.

d) One Billion Trees Program

The objective of this program is to have one billion more trees planted and growing by the year 2000. The program encourages and empowers the community to re-establish and maintain Australia's cover of native trees and associated vegetation. The program focuses on land outside national parks and other reserves.

e) "Landcare" Tax Provisions

Section 75B of the Income Tax Assessment Act provides for accelerated depreciation of capital expenditures on water storage and reticulation systems. The deduction applies to expenditure on the construction, acquisition, installation/extension of plant, or a structural improvement. Depreciation could be deducted in equal installments over three years. Section 75B is generally referred to as the land care provision, as the eligible items are expected to generate some resource management benefits. Section 75D provides 100% reduction for capital expenditure on control or prevention of land degradation in the year the cost is incurred.⁸

Qualifying expenditure on land degradation include eradication/extermination of animal or vegetable pests, destruction of weeds/plant growth detrimental to land, preventing/combating land degradation other than fence construction, construction of fences to separate different types of land to prevent land degradation (only with an approved land management plan), construction of levee banks or similar improvements, and construction of surface or subsurface drainage works for controlling salinity or assisting in drainage control.

The Australian Bureau of Agricultural and Resource Economics (ABARE) conducted the third of a series of related landcare surveys in 1993-94. The 1993-94 results showed that almost 40% of broadacre and dairy farms had some type of landcare expenditure. The average size of the expenditures claimable under section 75B was A\$4,500 (C\$4,598) and A\$2,800 (C\$2,861) for section 75D. Tree establishment and weed control were the most common landcare activities; however, overall farm expenditure on these activities is relatively small. Water storage and reticulation systems, and earthworks to control erosion or treat salinity and waterlogging problems represent the largest individual land care investments.

Farms with higher gross farm receipts are more likely to invest in landcare. The majority of farmers rated the availability of the landcare tax provisions as an important factor in their decision to invest in landcare activities. Of the total farmers who made no investment on landcare, 50% indicated an absence of land degradation problem or the problem had been resolved. The remaining 50% indicated inadequate cash as the primary reason for not investing in landcare.

In the same study, ABARE calculated a subsidy equivalent offered by the landcare tax provisions to broadacre farmers. Assuming all farmers will use income averaging and carry forward losses, the study concluded that about 10-20% of the individuals with allowable expenditures did not receive any benefits from the landcare tax provisions for the period 1991-92 and 1993-94. More than three-quarters of

⁸ Normal operating expenses are 100% deductible under Section 51 so small expenditures are often not segmented; however, for larger capital works, it is beneficial because of accumulated depreciation to separate landcare investments and claims under the landcare tax provisions.

farmers, received a subsidy equivalent to 50% of costs and claimed the allowable deductions. A small group of individuals with high taxable incomes received the largest benefit. While there is some evidence of a positive relationship between taxable income and the level of landcare expenditure, this is only apparent when taxable incomes begin to exceed A\$36,000 (C\$37,008) a year. Only a small proportion of operators and spouses in the broadacre sector have taxable incomes above this level.

Assuming landcare expenditures could be claimed under other tax provisions, in the absence of sections 75B and 75D, then the subsidy equivalent of up to 50% by the majority of individuals would be reduced to approximately 10 to 20%. Similar proportional reductions would apply to individuals with the highest taxable incomes.

The present value of the taxation revenue forgone by government is estimated to be A\$12.4 million–A\$1.5 million (C\$12.7 million–C\$1.5 million) for section 75B, and A\$10.9 million (C\$11.2 million) for section 75D. This calculation is based on total expenditures in 1993-94. If intended claims, instead of total expenditures, are used to represent claims under these provisions, then the estimated value of taxation revenue forgone is around A\$6.2 million (C\$6.3 million). However, if the landcare provisions were removed and if individuals could have claimed some of these expenditures under other provisions, then these estimates forgone would over state the revenue foregone by government.

2. Water programs

a) The Murray-Darling Basin Initiative

As stated earlier, this initiative consists of two main programs, the Basin Sustainability Program and the Water Business Program. The Sustainability Program has several subprograms such as the Natural Resources Management Strategy Investigations and Education program, the Natural Resources Management Strategy Integrated Catchment Management program, the Drainage Program and the Irrigation Management Strategy program. The Drainage program supports projects aimed at minimizing the environmental and production losses associated with land degradation. The Irrigation Management Strategy program aims to achieve an economical and environmentally sustainable and self-sufficient irrigation industry, in the southern Murray-Darling Basin by 2010.

The Water Business Program consists of the River Management subprogram, the Flow Regulation subprogram and the River Murray Works subprogram. These subprograms are designed to improve the management of River Murray, protect the physical and biological environment within the Murray-Darling Basin, and ensure each State's share of the River Murray water is supplied in a timely and efficient manner.

b) National Rivercare Initiative (NRI)

This program targets the sustainable management, rehabilitation, and conservation of rivers outside the Murray-Darling Basin. This program, combined with the Murray-Darling 2001 Initiative ensures degradation issues affecting all of Australia's river systems are addressed.

NRI is designed to complement other programs, such as the Waterwatch Australia and the National River Health Program. It funds projects in the area of community education, monitoring of river problems, implementation of local community action plans, identification of major barriers to improved water quality within a catchment or regional context, initiatives for priority river systems, and national river health assessment.

Government has committed A\$97.0 million (C\$99.7 million) over six years to NRI, and A\$12.4 million (C\$12.7 million) to be provided in 1997-98.

c) Waterwatch Program

This program is designed to encourage community participation in the monitoring of water quality, and increase community awareness of the natural environment. It provides a national focus for existing community-based water quality monitoring programs and to encourage the emergence of similar new programs.

d) National Land and Water Audit

To undertake a comprehensive national assessment of some 20 key types of land and water degradation, and provide an economic analysis of each problem. A specific component of the Audit will be the National Water Resources Assessment. It will focus on the supply capabilities and demand for water. This information is considered important in balancing agriculture and environmental considerations. This program will also fund the development of national indicators and inventories.

The government will make available A\$37.0 million (C\$37.8 million) over six years for the program. About A\$7.4 million (C\$7.6 million) will be provided for the program in 1997-98.

Both the State and Territory Governments have agreed to participate in the Audit and will assist in the gathering and assessing of data.

e) Murray-Darling 2001 Initiative

The Murray-Darling Basin is Australia's single most important agricultural region. It contains 26% of all Australian agricultural land and almost 75% of irrigated land. The value of its agricultural production exceeds A\$8.5 billion (C\$8.7 billion a year

(40% of Australia's total agricultural value).

This initiative targets high priority land and water degradation issues in the basin, such as the maintenance of key ecological processes, improvement of ground water resource management, improvement of the efficiency of irrigation water use, and reduction in salt, nutrient, sediment and pesticide exports from rural, urban and industrial sources. This initiative funds projects that improve the health of key river systems, encourage economically and ecologically sustainable land and water management, reduce salt and nutrient levels in river systems, and restore riparian land systems, wetland and floodplain.

A total of A\$163 million (C\$166.6 million) will be made available to this initiative over six years. This funding is subject to matching funding by other Murray Darling Basin Initiative partners. The 1997-98 allocation is A\$29.5 million (C\$29.6 million).

3. Education programs

a) Property Management Planning, 1997

This program provides assistance to farmers, grazers and their advisers to improve their business and strategic resource management skills, including short and long term planning, risk assessment and drought management. This is a joint project between the National, States and Territories governments. A total of A\$80.0 million (C\$81.7 million) has been committed over four years. Funding will be used primarily for supporting workshops.

b) Advanced Property Management Planning

This program provides assistance to farmers attending advanced property management training courses, and engage professional consultants for the purpose of developing integrated farm management plans.

D. Biodiversity

Since the eighties, Australia has been a signatory to a number of major international agreements on biodiversity. Biodiversity has been the focus for a number of national policy statements, including the 1995 National Strategy for the **Conservation of Australia's Biodiversity**.

The National Strategy for the Conservation of Australia's biodiversity relies on community support and community-based actions for its successful implementation. Programs involving collaboration between the community and government include the National Landcare program, the Community biodiversity Network, and One Billion Trees.

The Landcare movement has become one of the most important mechanism for integrating conservation of biodiversity into agricultural production. More than 2,000 Landcare groups are

currently in place across Australia.

Controls on native vegetation clearance and the incentive provisions for the retention of native vegetation vary between States and Territories. In South Australia, vegetation clearance is tightly controlled. New South Wales, Queensland and Western Australia are in the process of strengthening measures to control native vegetation clearance. The removal of incentives (e.g. tax incentives) that encourage deforestation has had a positive effect on the conservation of biodiversity.

The following section provides a brief summary of the key programs targeting conservation of biodiversity.

1. The Grassland Ecology Program

The program aims to identify important remnant native grasslands and grassy woodlands, and to develop strategies in consultation with the State and Territories to ensure the protection of these natural areas.

2. River Murray Corridor of Green Program

This is one of the community based program under the National Landcare Program. It aims to develop a vegetation corridor within a 50 km strip on either side of the River Murray. The program assists local communities to extend the existing vegetation corridors along riverside, rail-lines, roadside, and ridgelines, and to link them together into a network of vegetation that will help combat land degradation and loss of biological diversity. This program was announced in 1992 in the government's Statement of the Environment. A budget of A\$3.1 million (C\$3.2 million) was allocated over a four year period.

3. National Wetland Program

This program was developed in response to a growing concern over the accelerating loss of wetland, and in recognition of the need for the National government to provide leadership in the implementation of the Ramsar Convention⁹ on Wetland.

The primary goal of the program is to promote the conservation of Australia's wetland. The program funds the development of best practice management plans for Ramsar, sites survey and related work to gather detailed scientific information on wetland for inclusion in A Directory of Important Wetland in Australia, and research into wetland management issues. It also funds projects that promote community understanding of the importance of wetland, encourage community involvement in wetland management, and development of a training program for wetland managers.

⁹ The Ramsar Convention is an international agreement on wetland. Under the Ramsar Convention, signatories are required to designate Wetland of International importance (e.g. Ramsar sites), and are obliged to manage these sites to protect their special ecological values.

This program is administered by the Wetland, Waterways and Waterbird Unit of the Australian Nature Conservation Agency. It is anticipated that each State/Territory will develop three-year rolling plans for actions which are based on their own wetland strategies or policies.

4. Farm Forestry Program

The goal of this program is to encourage the integration of commercial tree production into farm operations. Such an operation could increase agricultural productivity and provide a method for landcare, conservation of biodiversity, and regional development. It offers an opportunity for producers to diversify income.

Between 1997-98 and 2001-02, the Natural Heritage Trust will provide A\$22 million (C\$22.5 million) to the program. This is in addition to the amount committed under the Wood and Paper Industry Strategy (WAPIS). In 1997-98, the funding for farm forestry is expected to total A\$1.6 million (C\$1.6 million).

Funds will target extension, demonstration, education and training, information gathering and dissemination, planning and coordination, and practical research and development activities aimed at enhancing the uptake of farm forestry.

5. National Vegetation Initiative

This initiative focuses on the protection of remnant native vegetation at risk from clearing, and the expansion of revegetation activities. It will fund projects that leads to the conservation, sustainable use and repair of Australia's native vegetation. This includes projects that increases the public's knowledge of the environment and natural resources (e.g. identification of vegetation in environmental functions such as catchment, hydrology and greenhouse gas sequestration), and programs and activities for the protection, re-establishment, management and investigation of native vegetation.

Community nature conservation activities are funded under this program. Community nature conservation activities are also supported by the One Billion Trees (OBT) program.

6. Endangered Species Program

The goal of this program is to ensure threatened species and ecological communities can survive, flourish and retain their genetic diversity and develop their natural habitat, and to prevent further species and ecological communities from becoming threatened.

This program funds projects relating to the preparation and implementation of recovery plans for endangered species, education and community projects which increase community awareness, involvement and support for threatened species/ecological communities, research or other activities for threatened species and ecological communities to obtain sufficient information for a recovery plan.

7. National Reserve System

This program targets the establishment and maintenance of a comprehensive and representative system of protected areas. The National Reserve System will contain all major ecosystems and include significant environmental values, and threatened species and ecological communities. Priorities will include acquisition of land to add to the national reserve system, strategic surveys essential for planning, management of threats to new acquisitions, and establish protected areas in indigenous and other privately owned lands. Proposals for this program are expected to come from State/Territory agencies.

E. Key players

The 1992 Intergovernment Agreement on the Environment recognizes the States and Territories have responsibility for the majority of environmental issues within their borders. The Agreement provides for the National government's involvement in issues where it has a responsibility and interest. It also establishes the National Environment Protection Council (NEPC). This Council has the responsibility for making environmental protection measures, and to assess and report on the implementation and effectiveness of the measures. NEPC is a statutory body with the power to make laws. Members of Council are Ministers, not necessarily Environment Ministers, appointed by first Ministers from each participation jurisdiction (e.g. National, State or Territory governments).

At the National level, the Department of the Primary Industries and Energy (DPIE), and Environment Australia are responsible for the development and implementation of key strategies and programs. Environment Australia is divided into five function groups known as the Environment Priorities and Coordination Group, the Environment Protection Group, the Australian and World Heritage Group, the Biodiversity Group and the Portfolio Marine Group. As indicated by the name, each group has a specific mandate. For example, the Biodiversity Group is responsible for managing the National government's responsibilities in relation to endangered species and marine wildlife, including exports and imports of wildlife. It runs community-based nature conservation programs, including One Billion Trees and the River Murray Corridors of Green. While both DPIE and Environment Australia are responsible for specific programs under the Natural Heritage Trust, this reserve resides within the Environment portfolio.

The Murray-Darling Basin Ministerial Council is responsible for the long-term planning and management of the basin's natural resources. Over the years, it has initiated a wide range of programs. The executive arm of the council is the Murray-Darling Basin Commission. This Commission is responsible for a range of programs relating to the management of the land, water and environmental resources of the Murray-Darling Basin. It also has the responsibility for the management and distribution of the waters of the River Murray.

For Landcare programs, community-dominated Regional Assessment Panels (RAPs) and community dominated State Assessment Panels (SAPs) are responsible for assessing project applications. Panel members include representatives from farm and conservation groups, local

government, non-government organizations, Aboriginal groups, and State government departments. Based on the recommendations of SAPs, the department of Primary Industries and Energy will provide funding to specific projects.

Proposals involving significant State/Territory funding require negotiation with relevant State agencies. Project applications are assessed by State Assessment Panels (SAPs), with representatives from community, farm and conservation groups, local government, non-government organizations, Aboriginal and Torres Strait Islander groups, and State agencies responsible for vegetation, land and water management and for nature conservation. Final decisions on the recommendations of SAPs are made by the Ministers for Primary Industries and Energy and Environment, Sport and Territories. Community-based activities may also be funded as part of the Partnership Agreements between the government of Australia and the States and Territories.

The Land and Water Resources Research and Development Corporation (LWRRDC) is responsible for identifying, managing, and funding of research and development activities that will significantly enhance the sustainable use, productivity and conservation of land, water and vegetation resources. This corporation was established by the National government in 1990, with the goal of providing a national focus and leadership, and improving collaboration between resource managers and researchers.

X **Provinces and States**

A. Quebec

The objective of this section is to review key Quebec agri-environmental legislation or policies specific to the management of mineral nutrients. The intent is not to undertake a comprehensive review on the province's agri-environmental policies and programs, but to provide a review of these regulations and highlight the complexities involved.

Furthermore, some of the municipalities within the Province have, or are in the process of developing, regulations limiting the expansion of the livestock industry. Most of the municipal regulations have focused on production zoning, separation distances, buffer zoning around urban development, and limits on the number of animal units per operation.

1. Environmental issues

According to the 1996 agricultural census, the province of Quebec has about 19% of all the livestock (cattle, calves, pigs, sheep and lambs) in Canada. Alberta leads the other provinces with 30% of all Canadian livestock, followed by Ontario at 20%. Of the livestock in Quebec, about 68% are hogs, 29% are cattle and calves.

The intensity of the livestock operations varies widely from province to province. There is a significant difference between the size of an average hog farm in Quebec and the other provinces. Currently, there are over 3.3 million hogs in Quebec (Appendix C), and the average number of hogs on a Quebec farm is 1,133, more than twice the Canadian average of 523 hogs. On the cattle and calf operations, the number of livestock per farm in Quebec are about half as many as in Alberta. This is due to prevalence of dairy operation in the cattle and calves figures compared to Alberta's predominant feeder and ranching operations. Quebec's cattle numbers are heavily influenced by the large number of dairy operations, whereas large ranching operations are the dominant form of cattle production in Alberta.

The number of intensive hog operations concentrated close to areas of high urban population has given rise to some major environmental concerns in Quebec. Two growing agri-environmental concerns are phosphorous levels in soil, and the nitrate content in water and soil. A number of the hog producers face the constant challenge of acquiring sufficient land for environmentally sound application of manure.

2. Overview of recent key policies and programs

On June 4, 1997, Quebec approved a new set of regulations (Regulation for the

Prevention of Pollution from Agricultural Sources) to reduce agricultural pollution. This regulation came into effect on July 3, 1997 and replaces the Regulation for the Prevention of Water Pollution Caused by Animal Production Facilities. This is a comprehensive legislation targeting livestock production, livestock buildings, as well as storage facilities. The objective of this legislation is to ensure the protection of soil and water from pollution caused by agricultural activities (e.g. livestock production, storage facilities). The main elements of this new regulation are summarized below.

a) Application of Manure, Farm Compost and Chemical Fertilizer

Effective October 1, 1998, producers are prohibited from applying manure, compost and chemical fertilizer during the period from October 1 to March 31. Producers with an environmental fertilizer management plan (PAEF) in place are exempt. Producers following a recognized conservation farming practice are also exempt. However, the conservation farming practice must be recognized and published by the Ministry of Environment and Wildlife (MEFQ). Manure application on snow covered or frozen soil is prohibited.

b) Phosphorous Usage

Effective December 1, 1998, the phosphorous content in chemical fertilizer spread on soils classified as rich or extremely rich may not exceed the amount of phosphorous found in the harvested crops. Also, the measures for reducing phosphorous in the soil must be detailed in the PAEF for soils classified as rich or extremely rich in phosphorous.

c) Agri-Environmental Fertilization Plan (PAEF)

The application of manure, composts and chemical fertilizers must be incorporated into an agri-environmental fertilization plan (PAEF). The PAEF will determine the level of manure, compost or chemical fertilizer to apply to the soil. The level of application will be determined after an analysis of soil and manure. Once the type of fertilizer is determined and the targeted output is estimated, the PAEF will also determine the most appropriate fertilizer application periods, and if required, the methods to be employed in order to reduce the amount of phosphorous in the soil.

The PAEF can be prepared and signed by an agronomist (member of l'OAQ), a professional technician (member of the l'Ordre des technologues professionnels of Quebec) on behalf of an agronomist, or a producer or associate who has been trained under a recognized program authorized by the Minister of Education of Quebec. A working group has been in operation since October to develop an appropriate training program.

A PAEF will be required for farms with the following land area.

Exhibit X-1 summarizes the PAEF requirements for land areas and dates:

Exhibit X-1
Summary of PAEF requirements for land areas and dates

Farm Practices	Total Area
Potato Farms	5 ha and more
Market Garden Farms, except for potatoes	5 ha and more
Corn for grain or silage	15 ha and more
All other farms except pastures and meadows that are not corn or cereal intended for fodder	25 ha and more

Target Client for PAEF	Date
New entrants	July 3, 1997
Farms with surplus manure* located within the limit of the basins near the Assumption, Yamaska and Chaudiere rivers.	October 1, 1998
Farms with surplus manure* located outside the limit of the basins near the Assumption, Yamaska and Chaudiere rivers.	October 1, 1999
Farms with liquid manure and farms with solid manure totaling more than 75 animal units	October 1, 2000
Farms which use mineral fertilizer on area exceeding 5 ha of potato or market garden products, 15 ha of corn-grain or silage and 25 ha other than hay and pasture	October 1, 2001
Farms with solid manure totaling 40 to 75 animal units	October 1, 2002

* Schedule III of the legislation provides a definition of a farm with surplus manure.

d) Application Registration

Pertinent information concerning fertilizer application must be recorded in an application register. This document is complementary to the PAEF, and will be mandatory as of August 1, 1997 for farms targeted by a PAEF. The register must be kept for a minimum period of two years and must be provided on demand by MEFQ.

e) Application of manure, composts and chemical fertilizer

The application of manure, composts and chemical fertilizer is prohibited at less than:

- 30 meters from a water source, individual well or surface water supply

- 30 meters from an underground water supply or surface water supply servicing two or more homes.

Manure application is prohibited at less than:

- 30 meters from an identified (by Quebec government) riverbed or lake
- 5 meters from the bank of a water source, ditch (cultivated or not), or lake
- 5 meters from a marsh that covers a minimum area of 10,000 square meters (1 hectare)

f) Protected zones

The regulation sets up a number of protected zones. These include:

- 15 meters from a water source or lake and the space beside each bank - measured against the high water table as a standard
- 30 meters from a water source for individual use
- 300 meters from a water source servicing the water supply (aqueduct - municipal or individual)
- 15 meters from a marsh, bog or pond, excluding irrigation ponds or those used in fire prevention.
- Within the 20 year flood line for a water source or lake

For exercise yards or storage facilities, the protected zones are expanded to include:

- 100 meters from a river or lake (for farms in operation after 1981) and 75 meters for those in operation before 1981.
- 30 meters for an exercise yard
- 75 meters for a storage facility servicing an exercise year

Within the protected zones, the regulation prohibits the:

- building of a livestock production facility
- modifications to existing livestock facilities
- changing the placement of such a facility

- modification of a structure to store liquid manure instead of solid manure
- change in the type of livestock production
- expansion of an existing operation
- expansion or modification of a storage facility for manure (cistern, lagoon)

The expansion or modification of an existing livestock facility, expanding the number of animals which results in an augmentation of manure, as well as expanding the storage of manure is permitted within the 20 year flood line for a lake or water source as long as it was in existence prior to June 10, 1981 and the number of animals does not surpass the maximum allowed.

g) Storage of manure (lagoon)

Exhibit X-2 summarizes details related to field storage and lagoons.

Exhibit X-2

Summary of details related to field storage and lagoons

Types of Farm	Requirements
Farms with less than 35 animals, solid manure and barns not located in a protected zone	The storage site can not be less than 75 meters away from a water source, well, surface supply, marsh, bog or pond. No storage facility is allowed to be constructed less than 100 meters from a lake, 100 meters from a river (30 meters for a farm operating before 1981), 75 meters from a water source (other than a river) but 30 meters for a farm operating before 1981, 30 meters from a ditch draining more than three areas.
A farm that has between 35 and 50 animals and operates solely on solid manure and barns are not in a protected zone.	Storage facility must be 150 meters from a water source, lake or ditch draining more than three areas, and 150 meters from a ditch alongside a public road and draining three or less agricultural areas.

Storage of manure from straw bedding is allowed as long as the accumulation is located at more than 300 meters from a water source servicing an aquaduct, 150 meters from a lake, water source, marsh, bog or pond and 30 meters from a ditch. The slope of the land must be less than 5 %. The manure pile must not stay in the same area for more than two years and should not be inside the 20 year flood line for lake or water source. Runoff must not reach the manure pile.

Only manure, bedding/straw, absorbent materials (e.g. straw, hay, harvest residues, wood chips, etc.), and water from precipitation can be included in the storage area for manure. The minimum capacity for storage is 250 consecutive days. This does not apply to storage facilities built before July 3, 1997. However, these existing structures must have a minimum storage of 200 days.

h) Importing and exporting manure

Agricultural producers who export or receive manure must record the following information in the register:

- origin or destination of the product
- name of the importer or exporter
- amount in cubic meters and type
- date of import/export.

The Environment Minister must approve the following types of construction projects.

- livestock production facility or exercise yard
- modification or expansion of a production facility
- modification or expansion of an exercise yard
- modification of a storage facility
- expansion of the number of animals
- change in type of animal if it results in increased manure production
- replacing the use of solid manure to liquid manure

B. Iowa

The objective of this section is to review key Iowa legislation or policy on agri-environment specific to the management of mineral nutrients. The intent is not to undertake a comprehensive review on this state's policies and programs, but to provide a view of the complexity of the agri-environmental regulations at the state level. To further add to the complexity of agri-environmental regulations, individual counties within the states also have or are developing agri-environmental regulations/ordinances.

For example, Humboldt County in Iowa passed an ordinance (ordinance No. 22) requiring owners and operators of large livestock confinements feeding facilities to provide details of their operation to the county for review by the general public. It also passed an ordinance (ordinance no. 24) targeting potential groundwater contamination from hog facilities.

1. Environmental Issues

Based on recent USDA statistics, there are approximately 12.2 million hogs in Iowa. This is over 20% of the U.S. hog population. Iowa is the largest hog producing state, followed by North Carolina (9.3 million hogs or approximately 16% of the US total) hogs and pigs. In addition to hogs, Iowa is also a major producer of poultry, cattle, and sheep within the U.S.

The relatively large livestock industry has generated agri-environmental concerns over the years. Some of the focus have been on mineral nutrients, such as the storage and disposal of nitrate and phosphate from manure. Odor and greenhouse gaseous emissions are also concerns. In 1994, results of a study suggested that Iowa applies more fertilizer to agricultural lands than any other state except Illinois, and it also applies the most chemical pesticides of any state with a total of 19,643,182 kg (43,215,000 lbs) in 1994 (1996 Iowa State Water Plan, Chapter 4).

Iowa passed a Groundwater Protection Act in 1987. This Act provides for a fee to be assessed on the use of nitrogen fertilizer and pesticides. The Leopold Center for Sustainable Agriculture was established at Iowa State University as part of the Act to study the impacts of agricultural activity on groundwater and surface water sources.

2. House File 519

In 1995, the State of Iowa brought in a new Act called the Animal Feeding Operation Act or House File (H.F.) 519. This is the single most comprehensive Act concerning livestock operations. This Act established new regulatory requirements for livestock feeding operations, including mandatory separation distances, an indemnity fund, manure management plans, penalties for repeated offenders, manure control requirements, and an additional nuisance defense. Cattle, swine, horses, poultry, sheep, and goats are included in the new regulations.

H.F. 519 also required the Iowa Department of Natural Resources (DNR) to adopt administrative rules to implement the Act. The rules had to be developed in consultation with representatives of livestock producer groups and other agencies and interest groups. The Animal Agriculture Consulting Organization (AACO) was formed as a result. This group comprised of members from organizations representing livestock producers, Iowa State University, Iowa Department of Agriculture and NRCS. AACO conducted public meetings to obtain comments and recommendations for specific administrative rules. This led to the development of a set of comprehensive animal feeding operation rules, which were adopted on January 16, 1996. These rules became effective March 20, 1996.

The rules provided many details on manure management plan contents, thresholds for obtaining a construction permit, and use of spray irrigation for manure. In addition, rules independent of the specific provisions of H.F. 519 were adopted including requirements for manure management plans for swine confinement, feeding operations with concrete pits and other formed structures, and inspection for drainage tile lines around new and existing confinement feeding operations.

The requirements of H.F. 519 apply only to confinement feeding operations, except for manure disposal separation distances, minimum manure control requirements (includes spray irrigation), and separation distance for anaerobic lagoons. These regulations are mandatory for all animal feeding operations. A confinement feeding operation is considered to be an animal feeding operation in which animals are confined to areas which are totally roofed. Open feedlots are included as animal feeding operations, but not a confinement feeding operation (CFO). Under the Act, even if an open feedlot is required to have an operation permit or a construction permit, or both, that operation is not a CFO and therefore is not subject to the requirements imposed upon a CFO.

a) Permit requirements of H.F. 519

Small confinement feeding operations do not require a permit from DNR for building. Confinement feeding operations requiring a construction permit include:

- A confinement feeding operation using an anaerobic lagoon or earthen manure storage basin that is designed for an animal weight capacity greater than 181,818 kg (400,000 lb.) bovine or 90,909 kg (200,000 lb.) for other animal species.
- A confinement feeding operation using formed manure storage structures (including tanks made of concrete, concrete block, wood or steel) that is designed to have an animal capacity equal to or greater than 727,273 kg (1,600,000 lb.) bovine or 284,091 kg (625,000 lb.) for other animal species.
- A confinement feeding operation which store manure exclusively in a dry form if it is designed for an animal weight capacity equal to or greater than 1,818,182 kg (4,000,000 lb.) bovine or 568,182 kg (1,250,000 lb.) for other animal species.
- A confinement feeding operation using an egg washwater structure if its animal capacity exceeds 90,909 kg (200,000 lb.).

Permits must be obtained prior to starting construction of the confinement building, construction or installation of manure storage structures, or prior to facility modifications which will significantly change the volume or manner in which manure is stored in the operation.

Permits will not be issue to repeat violators or to those who have pending action against them. If DNR determines that an operation needs a construction permit, then it must obtain one.

b) Separation distances for confinement feeding operations under H.F. 519

Separation distances are defined as distances between a feeding operation structure

and neighbouring residences or public areas. The separation distances are based on type of manure storage and animal weight capacity. All distances are measured from the closest point of the animal facility structure to the neighbouring house or building. Exemptions to these separation distances are granted if:

- the neighbour signs a written waiver and it is recorded at the courthouse;
- an existing operation expands away from the neighboring residence, and the expansion does not result in a new operation that is more than double in capacity or exceeds 284,091 kg (625,000 lb.), whichever is less; or
- an existing feeding operation was established prior to the neighboring residence and it does not expand.

Animal feeding operation structures can not be located within 152 m (500 ft) of agricultural drainage well surface intakes or known sinkholes, or within 61 m (200 ft) of navigable lakes, streams or rivers, except for farm ponds and privately owned lakes. Structures must also be from 100 to 1,000 feet from wells, depending on the type of structure and type of well. Separation distances are summarized in Exhibit X-3 and X-4.

Exhibit X-3
Separation distances for swine, sheep, horses, and poultry confinement feeding operations

	Size of Operation-Animal Weight Capacity	Residences, commercial enterprises, religious institutions, and educational institutions		
		Unincorporated Areas	Incorporated Areas	Public Use Areas
Anaerobic lagoons and uncovered earthen manure storage basins	< 200,000 lbs	1,250 feet	1,250 feet	1,250 feet
	200,000 lbs to < 625,000 lbs	1,250 feet	1,250 feet	1,250 feet
	625,000 lbs to < 1,250,000 lbs	1,875 feet	1,875 feet	1,875 feet
Covered earthen manure storage basins	1,250,000 lbs or more	2,500 feet	2,500 feet	2,500 feet
	< 200,000 lbs	750 feet	1,250 feet	1,250 feet
	200,000 lbs to 625,000 lbs	750 feet	1,250 feet	1,250 feet
Uncovered formed manure storage structure	625,000 lbs to < 1,250,000 lbs	1,000 feet	1,875 feet	1,875 feet
	1,250,000 lbs or more	1,500 feet	2,500 feet	2,500 feet
	< 200,000 lbs	None	None	None
Confinement buildings, covered formed manure storage structures and egg washwater storage structures	200,000 lbs to 625,000 lbs	1,000 feet	1,250 feet	1,250 feet
	625,000 lbs to < 1,250,000 lbs	1,500 feet	1,875 feet	1,875 feet
	1,250,000 lbs or more	2,000 feet	2,500 feet	2,500 feet
	< 200,000 lbs	None	None	None
	200,000 lbs to 625,000 lbs	750 feet	1,250 feet	1,250 feet
	625,000 lbs to < 1,250,000 lbs	1,000 feet	1,875 feet	1,875 feet
	1,250,000 lbs or more	1,500 feet	2,500 feet	2,500 feet

* Residences not owned by the owner of the animal feeding operation.

Other Separation Distance Requirements. All animal feeding operation structures, regardless of size must the minimum separation distance for the following areas:

Surface Intake of Agricultural Drainage Wells and Known Sinkholes	500 feet
Navigable Lakes, Rives, and Streams, excluding farm ponds and privately owned lakes	200 feet

Source: Gault, Chris Public Policy Counsel, Iowa Farm Bureau Federation.

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Exhibit X-4 **Separation distances for beef and dairy cattle confinement feeding operations**

Size of Operation-Animal Weight Capacity					Residences, commercial enterprises, religious institutions, and educational institutions		
			Unincorporated Areas	Incorporated Areas	Public Use Areas		
Anaerobic lagoons and uncovered earthen manure storage basins	< 400,000 lbs		1,250 feet	1,250 feet	1,250 feet		
	400,000 lbs to < 1,600,000 lbs		1,250 feet	1,250 feet	1,250 feet		
	1,600,000 lbs to < 4,000,000 lbs		1,875 feet	1,875 feet	1,875 feet		
Covered earthen manure storage basins	4,000,000 lbs or more		2,500 feet	2,500 feet	2,500 feet		
	< 400,000 lbs		750 feet	1,250 feet	1,250 feet		
	400,000 lbs to < 1,600,000 lbs		750 feet	1,250 feet	1,250 feet		
Uncovered formed manure storage structure	1,600,000 lbs to < 4,000,000 lbs		1,000 feet	1,875 feet	1,875 feet		
	4,000,000 lbs or more		1,500 feet	2,500 feet	2,500 feet		
	< 400,000 lbs		None	None	None		
Confinement buildings, covered formed manure storage structures and egg washwater storage structures	400,000 lbs to < 1,600,000 lbs		1,000 feet	1,250 feet	1,250 feet		
	1,600,000 lbs to < 4,000,000 lbs		1,500 feet	1,875 feet	1,875 feet		
	4,000,000 lbs or more		2,000 feet	2,500 feet	2,500 feet		
	< 400,000 lbs		None	None	None		
	400,000 lbs to < 1,600,000 lbs		750 feet	1,250 feet	1,250 feet		
	1,600,000 lbs to < 4,000,000 lbs		1,000 feet	1,875 feet	1,875 feet		
	4,000,000 lbs or more		1,500 feet	2,500 feet	2,500 feet		
	< 400,000 lbs		None	None	None		
	400,000 lbs to < 1,600,000 lbs		750 feet	1,250 feet	1,250 feet		
	1,600,000 lbs to < 4,000,000 lbs		1,000 feet	1,875 feet	1,875 feet		
	4,000,000 lbs or more		1,500 feet	2,500 feet	2,500 feet		

* Residences not owned by the owner of the animal feeding operation.
 Other Separation Distance Requirements. All animal feeding operation structures, regardless of size must the minimum separation distance for the following areas:

Surface Intake of Agricultural Drainage Wells and Known Sinkholes	500 feet
Navigable Lakes, Rives, and Streams, excluding farm ponds and privately owned lakes	200 feet

Source: Gault, Chris. Public Policy Counsel, Iowa Farm Bureau Federation.

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Animal weight classifications are summarized in Exhibits X-5 and X-6.

Exhibit X-5

Weight chart for swine (number of animals in operation)

Average Capacity	Sows (400 lbs)	Market Hogs (150 lbs)	Farrow to Finish (1442 lbs)
200,000 lbs ⁽¹⁾	500	1333	139
625,000 lbs	1563	4167	433
1,250,000 lbs	3125	8333	867
2,000,000 lbs ⁽²⁾	5000	13333	1387
> 2,500,000 lbs ⁽³⁾	5250	16666	1734

Small Animal Feeding Operation (SAFO)

Operations over this size are required to use aeration.

Not eligible for SAFO zero separation distances.

Source: Kohl, K., and J. Lorimor. Swine Manure Management and Iowa's Manure Law. *Livestock Industry Facilities and Environment*. Iowa State University, Ames, Iowa.

Exhibit X-6

Weight chart for cattle (number of animals in operation)

Average Capacity	Slaughter Cattle (1,000 lbs)	Feeder Cattle (625 lbs)	Dairy Cattle (1,400 lbs)
400,000 lbs ⁽¹⁾	400	640	287
1,600,000 lbs	1600	2560	1143
4,000,000 lbs	4000	6400	2857
6,000,000 lbs ⁽²⁾	6000	9600	4285

Small Animal Feeding Operations (SAFO).

Operations over this size are required to use aeration.

Source: Kohl, K., and J. Lorimor. Swine Manure Management and Iowa's Manure Law. *Livestock Industry Facilities and Environment*. Iowa State University, Ames, Iowa.

c) Manure management plan

Iowa law requires all new permitted and some new unpermitted confinement feeding operations and some previously permitted operations to prepare a manure

management plan. This is not a new concept as many operations had developed manure management plans prior to such plans being required. The focus of the plan has changed from emphasis on increasing crop yields to one of minimizing potential impacts on surface and groundwater.

Confinement feeding operations with construction permits obtained between 5/31/85 and 5/31/95 or which obtain construction permits after 5/31/95 are required to develop and file a manure management plan with the DNR. Open feedlots are not required to develop manure management plans.

The manure management plan must contain application methods, timing of application, location of application, estimate of annual livestock and manure production, and methods to minimize odor from spray irrigation equipment. It must also include an estimation of land required for manure application,¹⁰ written application agreements with other landowners if manure is applied on land not owned or rented by the confinement feeding operation¹¹, and methods and practices to minimize soil loss and potential surface water pollution. If manure will be applied on highly erodible land, the manure management plan must include a summary or copy of the conservation plan.

Manure management plans are required to be submitted to DNR only at the time of application for a construction permit, except for habitual violators. Permit holders are required to maintain a current manure management plan and records to demonstrate compliance with the plan. DNR reserves the right to inspect a confinement feeding operation and manure management plan records. Enforcement actions for violation of the terms and conditions of the plan are limited to assessment of a civil penalty.

A confinement feeding operation that is required to submit a manure management plan may submit a manure management plan for "sales of manure" if the operation has a history of selling manure or if it houses an animal specie for which selling manure is a common practice. Selling manure is defined as the transfer of ownership of the manure for monetary or other valuable consideration. Such a manure management plan consists of documentation of manure sales as a commercial fertilizer or soil conditioner under Iowa Law or a plan which shows

¹⁰ Calculations to determine land required for manure application from a confinement feeding operation must be based on nitrogen use levels to obtain optimum crop yield according to a crop schedule specified in the plan.

¹¹ At a minimum, these agreements must show the number of acres available and the length of the agreement. There is no required minimum length of the agreement. However, if land becomes unavailable for manure application, additional land must be identified in the plan before the next manure application period.

the intent to sell manure accompanied by manure sales forms and signed statements of intent.

Confinement feeding operations, other than cattle and dry manure operations, under the permit threshold requirements, but larger than 90,909 kg (200,000 lb.), and first populated with livestock after 9/22/95 must file an abbreviated manure management plan with DNR at least 60 days before applying manure. This plan must contain similar information as permit holders.

Under the rules, a limit is placed on the amount of nitrogen from both manure and non-manure sources which can be applied on land which receives manure under the manure management plan. This limit is based on the optimum crop yields established in the plan.

Rules governing manure application state that persons can not dispose of manure on cropland within 61 m (200 ft) of a known sinkhole, cistern, abandoned well, unplugged agricultural drainage well, agricultural drainage well surface inlet, drinking water well, lake, farm pond, or privately owned lake unless: 1) the manure is injected or incorporated within 24 hours of application or 2) the land has permanent vegetation within 15 m (50 ft) of the water source. Manure can not be applied within the 15 m (50 ft).

The law includes a requirements for minimum manure control. Existing federal law and DNR regulations already have minimum manure controls. A confinement feeding operation is required to retain all manure produced by the operation between disposal periods. Such an operation cannot discharge manure directly into a water of the state or a tile line that leads to water of the state.

All livestock operations are required to dispose manure in a manner that does not cause surface or groundwater pollution. Compliance with manure application regulations will satisfy this requirement. The law also requires that manure be removed from a livestock facility within 6 months of not using the facility for animals.

In general, no construction permits are required for swine operations classified as small animal feeding operations (e.g. <90,909 kg or <200,000 lb.). New or expanding operations over this size using lagoons or earthen manure storage structures are required to obtain construction permits. Swine operations over 284,091 kg (625,000 lb.) using any type of liquid or semi-liquid system will require construction permits and over 568,182 kg (1,250,000 lb.) need permits even for dry manure systems.

d) Regulation of water withdrawals

A livestock operation withdrawing in excess of 25,000 gallons per day of water is required to apply for a water withdrawal permit. Permitted withdrawals are subjected to limitations in use during times of low flow to protect streams and higher priority water uses. In times of drought, other measures could apply that would further restrict the water supply of a feeding operation. If the use of water interferes with a neighbor's use of the aquifer, well interference procedures could call for restrictions on use or compensation of affected landowners.

e) Spray irrigation

The use of spray irrigation equipment to apply manure is regulated by DNR rules. The rules apply to all animal feeding operations. The rules require that spray irrigation equipment be set up to provide a minimum of 30 m (100 ft) between the manufacturer's established wetted perimeter and the property boundary line. The actual wetted perimeter can not exceed the property boundary line. They prohibit runoff of manure onto adjoining property.

The rules also require separation distances for spray irrigation from residences, commercial enterprises, religious institutions, educational institutions or public use areas. These separation distances include:

- 303 m (1,000 ft) for manure from an earthen basin, formed manure storage structure,
- 228 m (750 ft) for manure from the first or second cells of an anaerobic lagoon,
- 152 m (500 ft) for manure from the third cell of an anaerobic lagoon or a run-off control basin,
- 30 m (100 ft) for manure from an aerobic structure.

Spray irrigation equipment with a center pivot system using hoses which discharge the manure at a maximum height of about 3 m (9 ft) and in a downward direction, and spray nozzles with a pressure of 11 kg (25 lb.) per square inch or less shall have a minimum separation distance of 76 m (250 ft).

The minimum separation distance can be reduced to 500 feet if manure from an

earthen basin, formed manure storage structure and anaerobic lagoon (first and second cells) is incorporated into the soil within 24 hours following completion of application or is applied once per calendar year for a period of less than four days during a consecution seven day period.

A separation distance requirement does not apply if a written waiver is executed by the property owner benefiting from the separation distance and recorded in the office of the recorder of deeds of the county in which the residence, etc. is located.

Variances to spray irrigation requirements may be granted by DNR if the need can be demonstrated.

f) Well separation distances

Structures constructed after the effective date of the rules are subject to the following minimum distances between public and nonpublic water supplies, which are summarized in Exhibit X-7:

**Exhibit X-7
Minimum distances**

Structure	Nonpublic Water Supply		Public Water Supply	
	Shallow Well	Deep Well	Shallow Well	Deep Well
Aerobic structure, anaerobic lagoon, earthen manure storage basin, egg washwater storage structure, and run-off control basin	400 feet	400 feet	1000 feet	400 feet
Formed manure storage structure, confinement building, feedlot solids settling facility, and open feedlot	200 feet	100 feet	200 feet	100 feet

g) Nuisance protection

H.F. 519 provides for a defense against nuisance lawsuits. This is Iowa's third right to farm law. The agricultural area law and chapter 172D are still available

nuisance defenses. They were not modified by H.F. 519. The new nuisance defense applies to both open feedlots and confinement operations. The new defense applies when the livestock operation has obtained all required DNR permits. However, if DNR permit is not required, the nuisance protection is automatically available to the livestock operation.

The nuisance defense applies regardless of the established date or expansion of the operation. The nuisance defense does not apply if the nuisance is caused by a failure to comply with federal or state law. Activities involved with livestock production are protected, including the treatment, disposal, transportation and application of manure.

The nuisance defense also addresses an element of a nuisance case called the locality of the operation. It is presumed that if the DNR requirements are met, the livestock operation is appropriate for the neighborhood. A person bringing a losing cause of action against a livestock operation found to be entitled to the nuisance defense must pay all costs and expenses of the defense if the claim is determined to be frivolous. The nuisance defense does not apply to injury or damage caused before the effective date of the Act.

There are four main differences between this nuisance defense and the agricultural area law. These include:

- This nuisance defense applies only to livestock related activities. The agricultural area law applies to whole farm operation.
- The nuisance defense does not require approval of the county board of supervisors while the Agricultural area law requires approval from the county board.
- The nuisance defense does not require a minimum number of acres while the agricultural area law requires a minimum of 121 hectares (300 acres), unless it is next to an existing agricultural area or agricultural land preservation district.
- The nuisance defense does not require a livestock operation to commit land solely to farm activities, as is required by the agricultural area law.

h) Drainage tile removal

For new confinement feeding operations, tile lines are required to be removed within 50 feet of the area where the outside toe of the berm of permitted earthen structures is situated. Tile lines at the site of a confinement feeding operation

using a formed manure storage structure must be removed but there is no minimum distance requirement.

For existing confinement feeding operations with construction permits for earthen structures issued after 12/31/92, they are required to investigate drain tile lines within one year of the effective date. Any tile lines discovered must be removed within 50 feet of the outside toe of the berm. Tile lines which extend into the berm must either be removed with prior permission from DNR or be filled with cement grout to the extent possible. Variances to this requirement may be granted by DNR and waivers may be granted if it can be shown that the location "does not have a history of drainage tile". A written record of the actions taken to remove tile lines must be kept as part of the manure management plan records.

Tile lines installed around existing earthen structures with construction permits, including those granted before 12/31/92, to lower a "perched groundwater table" is required to have a device to allow monitoring and shutoff of the tile water installed if there is no surface outlet accessible on the property. This device must be installed within one year of the effective date of the rules.

i) Engineering certification

A confinement feeding operation with a construction permit after the effective date of the rules must submit to DNR a certification from a registered professional engineer that the manure storage structure (other than dry manure) was: 1) constructed in accordance with the design plan, 2) supervised by the engineer or a designee during critical points of construction, and 3) inspected by the engineer after completion of construction and before commencement of operation, 4) constructed in accordance with the drainage tile removal standards of the rules.

j) Manure storage indemnity fund

A fund was created to assist with site cleanup at abandoned confinement feeding operations that come under county control. Money from fines that DNR collects from violations at a confinement feeding operation are deposited in the fund. There is a one time fee related to the construction of a confinement feeding operation. The size of this fee is related to the capacity of the permitted confinement feeding operation. Counties have access to these funds to cleanup an abandoned site when other sources of funding are not available.

Legislation establishes a one million dollar fund to help county governments clean up properties from confinement feeding operations the county has taken over for non payment of taxes. The indemnity fund cost for producers is a one-time fee for new operations applying for construction permits, and for operations with

construction permits issued after May 31, 1985. The fee is based on Animal Units (AU), one AU equals 2.5 swine over 55 pounds or 10 swine between 15 and 55 pounds. A summary of indemnity fund fees is provided in Exhibit X-8.

Exhibit X-8
Indemnity fund fees

Animal Weight	Fee Per Animal Unit Poultry	Fee Per Animal Unit Swine and Other
<625,000 lbs	2 cents	5 cents
625,000 to 1,250,000 lbs	3 cents	7.5 cents
over 1,250,000 lbs	5 cents	10 cents

Source: Kohl, Kris and Lorimor, Jeff, "Swine Manure Management and Iowa's Manure Law," Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, Iowa.

Example of a calculation: A 2,000 head swine finishing operation (equivalent of 800 AU) would pay US\$40.00 (800 AU * US\$0.05).

k) Proposed Amendments to H.F. 519

On July 21, 1997, DNR put forward AACO and it's own recommendations for rule changes. The proposed amendments are as follows:

- prohibit the construction of earthen manure storage structures in agricultural drainage wells drainage areas,
- prohibits spray irrigation of manure in agricultural drainage well drainage areas,
- design standards for concrete manure storage structures,
- earthen manure storage design standards, including soil testing and permeability, liner design, erosion control methods, and hydrology.

The proposed amendments represent a consensus between DNR and AACO. They differ in two areas. The AACO recommendations include a proposal to allow construction of earthen manure storage structures below the groundwater table if specific design and operational controls are followed. The DNR proposal does not allow construction below the groundwater table.

The AACO proposal allows artificial lowering of the groundwater table by both gravity flow and active (mechanical) methods. The DNR proposal allows artificial lowering of the groundwater table only by gravity flow and other permanent, non-mechanical methods.

The recommendations from both AACO and DNR were put forward for discussion.

Part 2

Assessment of the Applicability of the Programs to Canada

XI

Applicability Assessment

A. Introduction

The goal of this section is to undertake a qualitative assessment of the applicability of the various foreign programs. A quantitative assessment is not feasible given the limited information on each program.

Based on the information compiled in Part I, five major observations are noted. These include:

- The breakdown of responsibility between national and regional governments for agri-environmental issues vary considerably from country to country. This has an effect on the ability of certain national governments to deal with specific agri-environmental problems. It also has an impact on the instruments chosen to solve a particular problem.
- Each country is characterized by its own set of political, cultural and socio-economic factors. These, combined with the role and responsibility of the national government, could result in legislation acceptable in one country, but not to another.
- Policies and programs are developed to solve specific problems. The problem itself, and the severity of the problem, varies by country and the region within a country, and can change over time.
- The degree of the public's awareness and concern for agri-environmental issues can have an impact on the type of legislation, policies and programs implemented by the various levels of government. Generally, when agricultural activities occur in close proximity to large urban centres, the public is more aware and concerned about the effect agriculture and agri-food production could have on the environment. A related factor is the increase in rural non-farm population in OECD countries.
- Primary agriculture has undergone major structural changes in most developed countries over the last three decades. These changes are largely caused by

technological advancements and an emphasis on an expansion and improved seed varieties, breeding stock and use of farm inputs (e.g. crop protection chemicals and fertilizer). In many countries, these changes have led to an increase in concentration of farms and high livestock density. These factors have increased pressure on the environment, especially in areas where there is strong competition between agriculture and urbanization.

B. The approach

The applicability assessment focuses on national programs that were summarized in Part I of this report. The programs listed under the EU are excluded from this assessment as they are more of a framework or guideline for Member States to develop programs rather than actual programs. By assessing the programs in its Member States (e.g. Netherlands, Denmark, France), we will have captured the main elements of the EU programs. The applicability assessment will exclude landscape programs, as this is currently not a major agri-environmental concern in Canada.

The applicability assessment was approached in two steps. Step One involved the grouping of foreign country programs. The goal was to organize the numerous programs for comparison purposes. Step Two involved a qualitative analysis on the groups of foreign programs to determine their applicability to Canada.

C. The assessment

1. Step one - grouping of programs

The programs in Denmark and the Netherlands tend to have programs which are very direct in their effort to reduce the agri-environmental problems at source. For example, if methane emissions from ruminant animals is an identified problem, then a national program will target a direct solution, such as the mandatory construction of low emission housing for specific farms. In Canada and Australia, national programs are often broad in scope and not directed at sources of pollution. Differences in federal-provincial responsibilities, degree of problem, public awareness, and social and cultural views are some of the reasons for the differences.

The significance of an agri-environmental problem for a particular country can also be observed by the number of programs designed to deal with the problem. For example, surplus manure from intensive livestock operations is a major environmental concern in the Netherlands, where there are more than six programs to address this issue.

The diversity of the programs limits the ability to compare one country program with another. In an effort to provide some criteria for grouping, we have focused on the primary goal of the program. The reason is that almost all of the programs have an impact on more than one of the agri-environment issues being examined in this report (e.g. air, soil, water and biodiversity). As an example, a program restricting the timing of manure application will have an impact on soil, as well as water quality and biodiversity.

Based on our primary goals, we identified seven types of programs for the applicability assessment, which focused on the following: (1) reduced nitrate and phosphate from manure and chemical fertilizer, (2) reduced residues from pesticides (including herbicides and insecticides), (3) reduced ammonia and methane emissions, (4) improved land management (e.g. soil erosion, loss of top soil and organic matter, compaction), (5) prevention of surface and groundwater contamination, (6) preservation of habitats and wetlands (e.g. loss of gene pool and species), and (7) increased environmental stewardship and education. Environmental stewardship allows for the inclusion of programs directed at the integration of environmental practices into daily agriculture activities. As summarized in Exhibit XI-1, each of the seven program have an impact on one or more of the four environmental areas.

Exhibit XI-1
Impact of programs on the environment

Primary Goal	Air	Water	Soil	Biodiversity
Reduced nitrate and phosphate from manure and chemical fertilizer		✓	✓	✓
Reduced residues from pesticides, fungicides, and herbicides	✓	✓	✓	✓
Reduced ammonia and methane emissions	✓	✓	✓	✓
Improved land management		✓	✓	✓
Prevent on of surface and groundwater contamination		✓	✓	✓
Preservation of wetlands and habitats		✓	✓	✓
Increased environmental stewardship and education	✓	✓	✓	✓

Exhibit XI-2 provides an overview of the types of national programs implemented by country. The national programs include both economic (e.g. funding to assist in the adoption of clean technology) and regulatory instruments (e.g. restriction on the timing of manure application) being applied in each country. This summary indicates that Denmark and the Netherlands focus mainly on regulatory instruments including financial disincentives for reducing nitrate and phosphate from manure and chemical fertilizers. Programs in Australia, Canada and the U.S. tend to use voluntary economic instruments

to target land management and other agri-environmental problems.

Exhibit XI-2

Summary of national regulations and economic instruments employed by country

Issues	Canada	United States	Netherlands	Denmark	France	Australia
Nitrate and phosphate from manure and chemical fertilizers	No specific national program ¹² (Some provincial regulation and programs)	No national program (Some state regulation and funding)	A number of national regulatory and economic programs. Instruments include quotas, levy on excess manure production, restriction on timing of application, mineral accounting, and assistance to convert to organic farming.	Several national regulatory and economic programs. Most instruments focus on development of management plans, storage standard and needs, and timing and standard of application, and assistance to convert to organic farming.	Some national regulatory and economic programs. Instruments include tax on nitrogen emissions, manure storage requirements, maximum per hectare application of nitrogen, nitrogen balance sheets, and assistance to convert to organic farming.	No specific national program. (Voluntary Codes of Practice for hog and dairy production, and dairy processing .)
Residues from pesticides, insecticides, herbicides	No national program (some funding available to research the reduction of pesticide use).	No national program. (private applicators of restricted pesticides are required to maintain records)	A national program providing assistance to farmers who convert to organic farming.	Some national programs including an eco-tax on pesticides, the re-registration of pesticides and incentives for not spraying pesticide in sensitive areas.	Limited information to make assessment	No national program
Ammonia and methane emissions	No national program.	No national program.	National program targeting the reduction of ammonia emissions.	No national program.	No national program.	No national program

12. The Canadian CARD fund has a broad mandate and some of its programs, notably the National Soil and Water Conservation Program, provide financial assistance to producers to address agri-environmental issues (e.g. soil degradation and water pollution). Operations meeting these guidelines are considered to have met environmental requirements. As an example, a new hog operation constructed to meet the Code of Practice will not be subject to an environmental assessment.

Exhibit XI-2 (continued)

Issue	Canada	United States	Netherlands	Denmark	France	Australia
Land management	Some programs providing payment for the planting of permanent covers and set-aside, improve farm practices, and other activities leading to land improvements.	Some programs providing payment to set-aside fragile land, development of management plans, and adoption of practices leading to the prevention of soil erosion and losses.	Approached land management by targeting nutrient management.	A combination of mandatory and voluntary programs. Mandatory programs target nutrient management while voluntary programs provide incentives for long-term fallow areas and maintenance of grassland areas.	Some programs offering incentives to maintain extensive grassland areas and conversion of arable land to grass land.	Some programs offering assistance for prevention of soil erosion, degradation from weed and pests, and accelerated capital depreciation for land improvements.
Surface and groundwater contamination	No national programs, but some provincial programs.	Federal government provides State government with resources to fund the adoption of management practices leading to the restoration or enhancement of water resources.	Most of the programs target the reduction of nutrient leaching and run-off from agricultural production.	Most of the programs target the reduction of nutrient leaching and run-off from agricultural production.	Complex system setup to manage water resources. The States are responsible for the development of water policy.	A range of programs offering funding for communities to manage local water resources, and a national audit program to collect information.
Preservation of wetland, habitats	No direct programs, but funds from some of the broad programs could be directed to the preservation of wetland and habitats.	National programs providing payments to landowners for preservation and management of wetlands and habitats.	National programs consisting of management agreements for landowners to be compensated for maintaining wetlands and habitats.	National programs consisting of land acquisitions, management agreements with land owners, public afforestation projects and subsidies to favourable environmental practices.	Several national programs directed at the preservation of endangered species and protection of nature.	National programs directed at improving information, and preservation of native vegetation and wildlife.

Environmental stewardship & education	A component of a number of national programs	Some specific programs directed at education. Training is also a component of a number of other programs. U.S. has an extensive extension system delivering a wide range of services.	Some national programs improving environmental training for farmers.	Insufficient information to provide an assessment.	Some national programs providing training, technical support, and demonstrations.	National funding for training, and development of integrated farm management plan.
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2. Step two - are the programs applicable to Canada?

Canada's size, endowment of natural resources, and low population density means agri-environmental problems are generally less pressing than in the European countries examined in this report. Although Australia has a smaller land mass than Canada, it has similar characteristics in terms of natural resources, population and dry land farming. In both countries, some of the agri-environmental problems are serious only in very specific regions of the country.

In this section, we have identified a number of programs that could potentially be applicable to Canada. The assessment is based on the existence and degree of the problem, and whether there are currently any national programs in Canada to address the problem. An assessment of a foreign program is not made if it is similar to an existing Canadian program. It should be noted that some of the programs exist at the provincial level.

a) Nitrate and phosphate from manure and chemical fertilizers

Nitrate and phosphate from manure and chemical fertilizer is a limited problem in Canada. It is restricted mainly to intensive livestock and horticultural producing areas. These areas are located in parts of Quebec, Ontario, Southern Alberta, and British Columbia. While much of the agricultural land is located in the Prairies, production is generally less intensive. However, a number of integrated large-scale hog operations have recently been constructed in the Prairies, and additional large operations have been proposed for construction in the near future. This has led to a growing concern on the potential agri-environmental impact of these new hog operations.

As the problem of nitrate and phosphate from manure is limited to intensive livestock production regions, a national program targeting nitrate and phosphate from manure has not been deemed necessary. However, the federal CARD program, including the National Soil and Conservation Program, could be used to assist in funding projects relating to these issues. Some provincial and local programs exist in sensitive areas (e.g. Quebec).

Of the foreign programs targeting the reduction of nitrate and phosphate from manure and chemical fertilizer, the following instruments could be applicable to Canada, particularly in the high risk regions.

i) Restricting the timing of manure application

Some of the high risk areas in Canada are frozen for several months or have a period of high rainfall. A program restricting the application of manure during specific periods could potentially reduce the leaching of these nutrients into groundwater. The timing restrictions would need to be sufficiently flexible to recognize regional climatic conditions and agronomic factors.

ii) Restricting the quantity of manure to be applied

Limitations on manure application can be achieved by matching nitrogen and phosphate requirements with crop production could reduce the potential for leaching of these nutrients. This would lead to higher applications on more productive soils and in specific areas, depending on the location of the livestock operation.

iii) Imposing requirements on manure storage

Improvements in manure storage can be achieved through appropriate standards for storage facilities, capacity requirements, and location of storage facilities. All of these factors help reduce potential run-off problems.

iv) Imposing requirements on manure application

The majority of manure is currently applied through a combination of traditional farm practices and machinery. Recently, there has been increased interest in manure injection, which involves the application of liquid manure below the surface of the soil. This method ensures that the nutrients are available for plant growth and minimizes nutrient loss and potential or surface run-off. This method is most appropriate for large-scale livestock operations using liquid manure systems, or for all farms with liquid manure, in areas where custom operators are located.

v) Fertilizer Management Plan and Mineral Accounting

Manure and fertilizer management programs provide information relevant to total nutrient use and management on individual farms. Mineral accounting is an appropriate technique for developing an integrated farm nutrient plan. This approach would allow the establishment of maximum allowable loss levels, which provides a measure for performance. As an incentive for compliance, fines could be imposed for exceeding loss levels, as in the Netherlands.

vi) Adopting clean technology

An incentive program targeting the adoption of clean technology would be beneficial to the environment. It would allow producers to maintain their competitive position while increasing their ability to adopt clean technology.

A number of the above instruments are currently being considered or have recently been adopted by several provinces (see the Quebec section). For example, the province of Manitoba has recently drafted a set of regulations that incorporates a number of the above instruments, including nitrogen application rates, location of new manure storage facilities, and timing of manure application. If these regulations are implemented, about 1,700 livestock operations could be affected. (Western

Producer, January 22, 1998)

b) Residue from pesticide, herbicide and insecticide

The application of pesticides, herbicides and pesticides in Canada has been relatively stable in recent years. In general, residue from these chemicals are not considered to be a significant problem. However, there are some regional exceptions. An example is the Abbotsford area in British Columbia, where pesticide residues have been detected in some of the waterways.

Most of the federal regulations and programs concerning pesticides focus on the manufacturing and labeling of these products. There is no national instrument being employed to reduce the usage of these products.

Of the instruments identified in Part 1, three could be applicable to Canada.

i) Re-registration of pesticides

While Canada has replaced some harmful chemicals with more environmental friendly products, a re-registration of products would allow for a re-evaluation of existing products. This could be useful as additional information may have been made available since the product was registered.

ii) An eco-tax on pesticides

This economic instrument provides a strong incentive for producers to reduce pesticide use. However, a tax generally increases the cost of production, which would have an impact on the competitiveness of the farm sector.

iii) Promotion of organic farming

Organic farming could be an effective means to reduce pesticide and other chemical usage on farms. For such a program to be effective, there has to be clear standards for both the public and producers. Canada is currently working towards the establishment of national standards. Similar to Denmark and Netherlands, monetary incentives could be made available for farmers converting to this form of agriculture.

c) Ammonia and methane emissions

Canada does not have a national program targeting the reduction of ammonia and methane emissions, as they tend to be limited to a few areas of intensive livestock production. The recent Kyoto Protocol on greenhouse gas emissions (December 1997) may stimulate action in agriculture to reduce methane emissions over the longer term.

Within the foreign countries examined, there is only one program targeting the reduction of these gaseous emissions. This Dutch program requires the construction of low emission housing and minimization of ammonia emission. This program could be applicable to some of Canada's intensive livestock regions, such as parts of Quebec and Ontario. Such a program would strengthen Canada's goal to reduce these gaseous emissions.

d) Improve land management (loss of top soil and organic matter, erosion, salinity, compaction)

Soil erosion, the loss of top soil and organic matter, and compaction exist in a number of the agricultural regions in Canada. Soil erosion is a major concern on the Prairies, where 80% of Canada's farmland is located.

The Canadian government has been, and continues to be, very proactive in addressing soil degradation problems. A number programs have been implemented to improve land management. (see Canada section for specific programs). In recent years, there has been a significant increase in the number of farms adopting conservation practices, such as no-tillage.

The following foreign country programs may be applicable to Canada.

i) Landcare tax provisions

This Australian program allows an accelerated depreciation of capital expenditure associated with land improvements. Such a program would provide some incentive for producers to invest in land improvements.

ii) Landcare program

As environmental issues extend beyond the farmgate, a program that provides assistance to communities to take collective actions to manage their environment and natural resources in partnership with government could be beneficial to everyone.

iii) Conservation reserve program

Currently Canada has similar programs (e.g. permanent cover program) targeting the Prairie Provinces and the Peace River region of B.C. The Federal government could expand these programs to include other fragile or sensitive areas, provided economic and environmental benefits warrant such an expansion.

e) Surface and groundwater contamination

While there is no evidence of a wide spread pollution problem in Canada's water systems, nitrate, phosphate and bacteria have been detected in certain agricultural regions. In some instances, the nitrate level has exceeded the standard for drinking water. Water quality degradation from agriculture is highest in areas with higher livestock densities, or crop land using greater amounts of fertilizer and pesticides.

More attention has been focused on this issue in Canada, as more scientific information emerges on potential surface and groundwater contamination and its impact on the public health. An example are the results of the comprehensive five-year joint Federal-Provincial study on Alberta's water systems released in January 1998.

This study confirmed that the quality of water is generally safe, but there are specific regions where water quality is an issue. The results were compiled from farmstead wells, dugouts, irrigation canals, streams, and limited rivers and lakes. It focused on chemicals, such as fecal coliforms, nitrogen, phosphorus and herbicides. (Western Producer, January 29, 1998)

i) National land and water audit

A comprehensive national assessment of selected key types of land and water degradation accompanied by an economic analysis of each problem would increase Canada's knowledge of its own resources. This would allow for the development of programs that consider environmental and economic costs and benefits. This combination would ensure sustainable development for the agriculture and agri-food industries.

ii) Environmental Quality Incentives Program (EQIP)

Funds from a portion of this U.S. program provide assistance to promote the management of non-point pollution sources. Support is given to activities leading to farm management practices that restore or enhance water resources. Such a program could provide an incentive for producers to adopt farm management practices that improve water quality. This could be particularly useful in regions where water quality is or could be a concern.

f) Preservation of habitats and wetlands

Canada has one quarter of the world's wetlands in spite of the significant losses that have occurred over the past number of decades. Canada is also the custodian of a number of breeding grounds and migratory paths for a variety of birds.

No national program specific to conservation of wetland or sensitive ecosystems currently

exists. However, a national non-profit organization has worked with a number of partners to help restore and maintain wetland areas for waterfowl. Efforts are ongoing within the Federal government to increase Canada's knowledge of biodiversity.

The following foreign programs may be applicable to Canada.

i) Management agreements

A voluntary contract defining management practices to preserve nature and maintain biodiversity could be implemented. To ensure participation, the level of compensation would need to reflect any income foregone or additional costs that may be required to undertake the conservation practices.

ii) Wetland Reserve Programs

A program that provides a payment for voluntary set aside of wetlands may be an effective tool to preserve these areas. For such a program to be effective, monitoring would be required.

g) Integration of environmental stewardship and education

The various levels of government in Canada have promoted the integration of environmental stewardship into daily farming practices. More and more farm organizations are also promoting this concept. This has led to the development of Codes of Practices for specific types of agriculture.

While national programs specific to environmental stewardship and education do not exist in Canada, some of the CARD funds are available to support activities leading to the improvement of environmental stewardship. An example of this is the Ontario Environmental Farm Plan Program. Provincial support is also available for the development of a whole farm plan and education in some provinces.

The foreign country programs most applicable to Canada include:

i) Cross-Compliance of Programs

While the integration of stewardship into daily agricultural activities is encouraged in Canada, there are no direct economic incentives or cross compliance programs to ensure this does take place. It would be very difficult to use a cross compliance program similar to the US since the level of government support to agriculture is more limited in Canada. However, there may be an opportunity to develop a cross compliance program in conjunction with the federal-provincial crop insurance programs or possibly NISA.

ii) Conservation plan for individual farms

The development of conservation plans for individual farms would be useful for planning, information gathering, and compliance purposes. While assistance could be made available to producers to complete a plan, implementation may be difficult.

It would also be very difficult and costly for Canada to implement a conservation plan for every farm as the US has done with its Highly Erodible Land Conservation Compliance program. The US has a vast extension service which has administered programs such as the acreage reduction program over the past few decades. It has historical information on farm base acres and yields by land parcel.

iii) Education and extension programs

Programs that provide assistance to farmers for planning and implementing soil and water conservation practices could also increase the integration of environmental stewardship into daily farm practices.

Part 3

Potential Impact on Hog and Field Crop Producers

XII

Sectoral Assessment

A. Overview and approach

Part 1 of this report focused on national policies and programs specific to air quality, water quality, soil conservation, and biodiversity. Part 2 of this report built upon this information and focused on the applicability of these programs to Canada. Part 3 summarizes the potential financial impact of the major programs contained in this report, in relation to hog and field crop producers. This qualitative review was completed in two steps as follows: (1) Step 1 - focused on the impact of programs in terms of capital investment costs and annual operating expenses, and (2) Step 2 - focused on the agri-environmental issues that producers would be confronted with, during the construction of a large hog operation in either Quebec and Iowa.

B. Relevant factors

- The structure and performance of industries, and the businesses within those industries, reflect historical and current developments in the areas of government policy and legislation, market demand, and domestic and international marketing factors, including trading agreements. At any point in time, the different sectors within a country's agricultural industry, including the livestock and field crop sectors, are confronted with a unique combination of such factors which define the operating conditions in which the sector operates. Agri-environmental policies, and programs represent one such factor within the overall policy area. At the producer level, agri-environmental programs and requirements are generally perceived to be restrictive in some manner, and therefore represent either a direct or indirect cost to the business.
- In the case of Canada, federal and provincial governments share the responsibility for agri-environmental issues and intervention ranges from national strategies and initiatives, to Federal-Provincial Agreements and provincial laws, regulations and programs. For a combination of reasons, including limited historical problems, there is not a mandatory national requirement for Canadian hog and field crop producers to complete a mandatory environmental assessment or a manure management plan, prior to expanding or establishing a hog operation. This is in direct contrast the various requirements in countries such as Denmark and the Netherlands. In general, this indicates that Canadian producers have more flexibility in terms of enterprise planning, production practices and field operations; this also implies that Canadian producers have fewer agri-environmental policy-related barriers to entry,

which decreases or eliminates policy-based capital and operating costs.

- In the US, there is a trend towards much stricter compliance requirements under the national Environmental Protection Act (EPA) and EPA is getting much more involved in livestock waste management issues. However, in terms of intensive hog production, there are still important location or geographical issues in the US. For instance, there are currently 22 states which by law, cannot adopt environmental regulations that are more restrictive than federal regulations. Given that there have been limited federal regulations related to livestock waste management, some states are more attractive than others in terms of establishing new intensive hog operations. However, county requirements and restrictions are extremely important, even within individual states. Therefore, operating conditions can vary considerably in the US, as a result of agri-environmental requirements. In terms of US hog production, it is important to maintain a perspective on the size of the industry. The top five hog-producing states have approximately 34.5 million hogs, which is almost three times the size of the Canadian industry. In 1996, Iowa was the largest hog-producing state with over 12 million hogs, which was equal to the Canadian industry, or three times larger than the hog industry in Quebec, which is the largest hog-producing province in Canada (see Appendix C).
- Environmental issues, concerns and programs vary from country to country in Europe. In the Netherlands and Denmark, intensive agricultural production practices have resulted in a number of environmental concerns related to methane and ammonia emissions, the efficient and effective disposal of surplus manure, and the use of pesticides and herbicides. In France, which has a larger land area and a lower population density, these are generally regional issues. As indicated in previous sections of this report, a wide range of strategies and actions have been undertaken. However, one trend is very clear. Agri-environmental requirements for intensive livestock operations have increased significantly during the last ten years, and in part, these requirements have limited the expansion of the hog industry in both Denmark and Netherlands. In addition, current policy objectives in the Netherlands are clearly focused on reducing the size of the hog industry. Given the severity of the problems that exist, one could expect increased requirements in field crop sector, which could contribute to similar results.
- The basic economics related to hog production suggest that feed costs are significant for producers in all countries. In terms of field crop production, the cost of farm inputs and land are critical factors affecting all producers. Therefore, producers face a number of issues and many of these have a much larger financial impact on the business than do agri-environmental issues. In general, policy-based agri-environmental requirements are incremental costs. However, at some point in time, these incremental costs cannot be offset through improved technology, farm practices, or cost reductions. Based on the extensive information reviewed, it appears that many of the basic program requirements such as restrictions related to timing of manure application and possibly minimum distance requirements, result in relatively minor capital costs and incremental operating expenses. However, as policies and programs begin to limit the actual operation of a farm (e.g. manure application rates), they begin to affect critical decisions such as farm expansion, farm location, and the entry or exit strategies from the industry. This situation can be extended further and in extreme situations, existing operations

cannot expand and profit margins are eroded, which leads to the eventual closure of the operation.

C. Step 1 - hog and field crop production

Step 1 represents an overview of the major national programs, in terms of their potential impact on capital investment costs and annual operating expenses for both hog and field crop producers. Specific reference is also made to provincial programs in Quebec, and state programs in Iowa. As indicated, many of the major programs and policies highlighted in this report have either a direct or indirect impact on hog and field crop production¹⁴ in the various countries. The results of this review are summarized in Exhibits XII-I to XII-8. These tables identify the following: (1) name of the specific legislation or program, (2) sector being discussed, (3) operational issues (e.g. specific issues addressed by the legislation or program), (4) potential financial effect (a qualitative assessment related to the direct or indirect impact of the legislation or program (e.g. location and distance requirements generally have a direct impact on location of new buildings and renovations), and (5) notes (additional comments on the specific legislation or program). In conclusion, Exhibits XII-1 to XII-8 highlight specific financial implications for hog and field crop producers, which are essential factors affecting a sector's ability to cope with agri-environmental requirements, improve production efficiencies, control or reduce production costs, and expand, in terms of the number of producers, financial returns, and location. The findings from this assessment include the following:

1. Capital costs

Capital costs are investment costs related to mobile and fixed assets such as farm equipment, manure storage facilities, and barns. In general, a capital expenditure can also increase annual operating expenses, by increasing the following: (1) annual interest or opportunity expenses, (2) depreciation (e.g. five to 25 years), and (3) associated labor costs (e.g. different manure application methods and machinery have different farm labor requirements). The review found that current policies and programs increase capital investment requirements on hog operations in specific countries, which thereby increases annual operating expenses and per unit production costs. Generally, capital cost requirements are location specific and occur when: (1) the expansion of an existing facility is restricted (e.g. limited land base for manure application), (2) an expansion requires additional land, which necessitates relocation and establishment of new facilities, (3) improved equipment is required, (e.g. manure injection equipment in comparison to traditional manure spreading equipment), and (4) environmental assessment results dictate that an alternative, and more expensive, site is considered and purchased.

¹⁴ None of the policies and programs reviewed in this study specifically affect wheat producers. Therefore, the term field crops has been used to illustrate the broader application and importance of the programs and policies.

2. Operating expenses

In general, agri-environmental regulations change the manner in which a compliant hog operation is managed. In some cases, these changes can represent a direct incremental expense; in other situations, these changes can produce agronomic and financial benefits (e.g. improved incorporation of plant nutrients). Therefore, the change in total operating expenses is dependent upon two factors: (1) the pre-regulation status of an operation or industry, and (2) the magnitude of the change. The resulting agronomic and financial benefits are largely determined by the unique circumstances faced by individual farmers.

Operating expenses include all expenses required to manage an on-going business during the year (e.g. regular occurring expenses). In addition to interest, depreciation and field labor expenses outlined above, specific waste or environment-related operating expenses also include items such as: (1) increased management time or labor expenses (e.g. various requirements including manure management strategies, inspections, and field monitoring), (2) increased transportation expenses (e.g. longer transit distances for farm inputs and finished animals), and (3) increased equipment operating expenses (e.g. time and fuel for field operations related to prescribed manure application periods, and expenses associated with planting and cultivation of fall cover crops).

3. General findings

Based on the review completed, there are a number of general findings including:

a) Relative significance

The complexity of the various policies and programs vary considerably, and as a result, the impact on farm capital costs and operating expenses also vary in a significant manner. In general, the national policies and programs that are in effect in Denmark and the Netherlands have the largest impact on the structure and management of hog operations. In both cases, policies and programs restrict the amount of manure that can be applied to farm land, and directly and indirectly restrict the size of hog operations. In addition, the objective of the EU Directive 85/337/EEC is to harmonize environmental assessment across all Member States, which could have direct financial implications for all new and expanding operations. In regards field crop production, the policies and programs reviewed have a limited direct impact on annual operating expenses and production costs.

b) Common cost factors

In financial terms, three policy and program requirements have the most significant impact on capital costs and operating expenses (production costs): (1) manure management requirements (e.g. minimum storage periods), (2) location requirements (e.g. mandatory distances to other farms, communities and waterways), and (3) farm management compliance requirements (e.g. annual planning and monitoring).

c) Farm management changes

Limitations on applied nutrient levels appear to have the most significant and continuous impact on farming operations. Basically, nutrient limitations related to crop uptake are an extremely practical measure and effectively limit both manure and commercial fertilizer application levels. Consequently, cropping practices permanently change and farmers can obtain direct financial benefits, depending upon the cropping system that is adopted.

Exhibit XII-1

The impact of major programs on hog production - Canada

Country/ Province or State	Verification Programs	Sector	Operational Issue	Potential Financial Effect	Notes
Canada	Canadian Environmental Assessment Act (1995) <u>Note:</u> Canadian Environmental Protection Act was enacted in 1988. New proposed CEPA focuses on pollution prevention.	Hogs <u>Note:</u> CEAA does not apply to privately-funded hog operations	Potential impact on location, if private sector implemented full environmental assessment process and findings	costs associated with completing the assessment costs associated with alternative locations (e.g. purchase price, taxation and transportation) potential changes in location complicate start-up, given the variable procedures on a municipal and county basis (e.g. plans and permits)	CEAA only applies to the agricultural industry if government funding involved. If an assessment is conducted, alternative sites may have to be considered. If private sector voluntarily adopts CEAA guidelines as a business practice, the above location issues could arise (e.g. self-directed environmental assessment)

Exhibit XII-2

The impact of major programs on hog production - Quebec

Country/ Province/ State	Federal/ Provincial Programs	Sector	Operational Issue	Potential Financial Effect	Notes
Quebec	New regulations effective July 3, 1997	Hogs	Location	capital costs could increase due to requirements related to protected zones (includes the modification and construction of facilities), which limit expansion in some cases	approvals required for a various activities ranging from construction to expansion of herd size
Quebec has the largest provincial hog industry in Canada in 1996, there were approximately 3.3 million hogs (30% of the Canadian total), on 3,040 farms (a 13% increase since 1992)	Profile of Hog Industry: • hog production is concentrated in the Beauce, Quebec City, Richelieu Valley, Saint-Hyacinthe and Lanaudiere regions where environmental issues are of greatest concern • Quebec has the highest hog density in Canada		Manure Management	capital costs could increase due to requirements related to (1) location, (2) capacity of manure storage facilities, and (3) application periods	approval required for altering manure handling practices increased planning required (see farm management)
			Farm Management/ Compliance	1. operating costs could increase given the requirement to complete an Environmental Fertilizer Management Plans (PAEF)	• various target compliance dates have been established, ranging from July 3, 1997 to October 1, 2002

Exhibit XII-3
The impact of major programs on hog production - United States

Country Province or State	Legislation Programs	Sector	Operational Issues	Potential Financial Effect	Notes
United States	National Environmental Protection Act (1969)	Hogs	Trend is towards much more stringent EPA compliance requirements	1. pollution prevention is the major EPA focus and defines its basic agricultural role currently, only confined animal feeding operations (CAFOs) require waste permits 2. current federal regulations do not address issues related to land application, nutrient management, facility construction and waste system operator training (all are being considered and can affect operational and capital costs on an individual farm basis) 3. significant penalties related to illegal waste discharges indirectly increase capital costs, due to increased compliance requirements	• by law, 22 states cannot adopt environmental regulations which are more restrictive than federal regulations • EPA getting more involved in livestock waste management issues • CAFOs to be priority for enforcement and compliance actions in 1998
	Endangered Species Act (1973)	Hogs	Manure Management	1. as outlined above	• significant manure-related fines have involved EPA's Criminal Investigation Division
	Clean Water Act (1972)	Hogs	Manure Management	1. as outlined above	• as outlined above • regulations allow land application to be addressed in permits issued under National Pollutant Discharge Elimination System (NPDES)

Exhibit XII-4
The impact of major programs on hog production - Iowa

Country Province or State	Legislation Programs	Sector	Operational Issues	Potential Financial Effect	Notes
Iowa	Animal Feeding Operation Act or House File 519 (1995)	Hogs	Manure Management	1. in general, the Act influences farm operations, annual operating expenses, and capital investments, which in combination, can increase production costs 2. operational permits are required prior to the construction of new confinement buildings or manure storage, plus changes that will change the volume or manner in which manure is stored (construction permits also required) 3. farm and field operations largely influenced by manure management and disposal rules (plus a farm's manure management plans which is based on maximum nitrogen level for all land)	- single most comprehensive act concerning livestock operations in Iowa (regulations are mandatory) - animal feeding operation rules became effective March 20, 1996 - enforcement actions for violation of the terms and conditions of the manure plan are limited to civil penalties - focus of the manure management plans are away from increased crop yields to a minimization of surface and groundwater contamination
	<u>Profile of Hog Industry:</u> - Iowa has the largest hog industry in the US - in 1996, there were 12.2 million hogs on 21,000 farms (an 18% reduction from 1992 and a 24% reduction from the 16.0 million reported in 1980) - the industry trend is toward fewer and larger integrated operations, plus increased contract production - projections indicate that hog numbers in Iowa will increase, which indicates that environmental compliance is not overly restrictive		Location of facilities and separation distances	1. capital costs can be affected by the separation distance 1. spray irrigation separation requirements can limit coverage and use of equipment on specific property	
			Permit Requirements (Water)	1. water withdrawal permit required if daily needs exceed 25,000 gallons	

Exhibit XII-5 The impact of major programs on hog production - Denmark

Country Province or State	Legislation Programs	Sector	Operational Issue	Potential Financial Effect	Notes
Denmark	Environmental Protection Agency (1973 and 1991) <u>Note:</u> Guidelines to reduce nutrient leaching from agriculture were introduced in 1985-86	Hogs	Manure Management	1. overall increase in capital costs, related to the significant manure storage requirements (minimum 9 month storage capacity for large operations) 2. overall increase in capital costs, given requirement to own 75-100% of the land required for manure disposal on larger operations 3. moderate increase in cash operating costs related to planting green cover crops on at least 65% of farm area for winter nutrient uptake 4. limited potential to reduce unit production costs, due to all combined factors restricting the size of operation	• overall strategy was to reduce pollution resulting from nutrient leaching • <u>mandatory</u> environmental impact assessments (EIA) required since 1994, consistent with European Union directive on EIAs • farm fertilizer strategies must be completed twice a year and manure production and crop uptake have a direct impact on the amount of commercial fertilizer used on the farm • in 1990, after five years of efforts, leaching from agriculture was essentially unchanged and the 50% reduction target was extended to the year 2000
	Action Plan on the Aquatic Environment (1987)	Hogs	Manure Management	1. ban on spreading manure on frozen and bare soil, and incorporation requirements (within 12 hours), affects timing of manure disposal and field operations, which can potentially increase cash operating costs	• additional requirements that must be incorporated into compulsory fertilizer management plans (as indicated above)

Exhibit XII-6

The impact of major programs on hog production - Netherlands

Country Province or State	Legislation Programs	Sector	Operational Issue	Potential Financial Effect	Notes
Netherlands	The National Environmental Policy Plan (1989 and 1994)	Livestock including hogs	Operational guidelines for agricultural industry	1. the "polluter pays" principle is one of the major factors incorporated within national environmental policy (agriculture is regarded as a major problem area and the industry has significant compliance requirements, enforced through significant legal action)	- overall objective is to restore the environment within 25 years - NEPP2 is a national framework that can be used to deal with all major issues related to acidification and eutrophication caused by agriculture
	Policy Document on Manure and Ammonia (1995 and 1996)	Hogs	Manure Management	1. increased operational expenses (e.g. reporting and manure transport), and capital investment costs, related to low emission levels, plus manure storage and application requirements 2. limited potential to reduce per unit production costs, due to limitations on farm size, combined with limitations on manure quotas and decreasing manure application levels	- mineral accounting system in force January 1, 1998 - hog industry expected to have the most difficulty in meeting manure targets and requirements - farms with stocking densities below the minimum requirements for mineral accounting will be expected to follow the basic measures applying to larger operations

Exhibit XII-7

The impact of major programs on hog production - France

Country Province or State	Legislation/ Programs	Sector	Operational Issue	Potential Financial Effect	Notes
France	Law on Classified Facilities (1976)	Hogs	Manure Management	1. the law is based on the "polluter pays" principle, which accounts for all risks, pollutants or nuisances (concept is enforced through inspections, monitoring and legal action) 2. operational expenses and capital costs are affected by the requirement to adopt or meet standards associated with the best technologies available	• provides for integrated pollution management, although the primary focus is on the reduction of water pollution
	The National Environmental Plan (1990)	Hogs	Manure Management	1. on-farm manure management plans to be consistent with the overall objective of reducing nitrate pollution in vulnerable areas by 80% 2. the combined requirements will directly and indirectly limit the size of hog operations in specific areas, which has an impact on per unit production costs	• represents a more rigorous implementation of environmental policy and legislation • series of 10 year objectives spanning the 1990-2000 period • direct and indirect impacts on all livestock operations

Exhibit XII-8

Major programs and their relationship to field crop production - all countries

Country	Legislation Programs	Harvested Field Crop Area (1996) (Mill Ha)	Operational Issues	Potential Financial Effect	Notes
In general, few of the national Acts, policies or programs discussed in this report have an immediate, direct and quantifiable impact on field crop production costs, which is in contrast to the situation for hog production. This statement is based on the assumption that approved crop inputs (e.g. fertilizer and crop protection chemicals) are used correctly, and in the manner and at the rate prescribed by the manufacturer. In fact, the case could be made that environmental regulations have tended to reduce crop production costs for farmers close to large livestock operations, by requiring improved manure and nutrient management practices, which have resulted in reduced commercial fertilizer applications. The following comments are meant to be illustrative only, and relate to potential cost implications.					
Canada	Pest Control Products Act	21.13	Crop Inputs	1. Pest Management Regulatory Agency (PMRA) implements Act and has established Alternatives Division to facilitate sustainable pest management practices	establishes parameters for manufacturing, storage, distribution and use of any control products
United States	Toxic Substances Control Act (1976) Resource Conservation And Recovery Act (1976) Pesticide Environmental Stewardship Program (1993) National Organic Program (1990)	65.11	Crop Inputs	1. in general, crop input costs increase with regulation, which increases national crop production costs	regulations related to all chemicals used in agriculture, including microbial biotechnology products, storage and disposal activities
			Crop Inputs	1. in general, conversion to integrated pest management practices and national standards should assist in controlling production costs and support product differentiation in domestic and export markets	primary objective is to reduce the use of pesticides in agricultural production
Denmark	Environmental Protection Act (1973 and 1991)	1.58	Reduction of nutrient leaching	1. manure application limits - nutrient balancing restricts commercial fertilizer use through fertilizer strategies and budgets	basic operational concern is excessive nutrient loading and leaching

Exhibit XII-8 (continued)
Major programs and their relationship to field crop production - all countries

Country	Legislation Programs	Harvested Field Crop Area-1996 (Mill Ha)	Operational Issues	Potential Financial Effect	Notes
	Action Plan on the Aquatic Environment (1987)		Reduction of nitrogen and phosphorus discharges	1. compulsory fertilizer management plans (manure limitations/ha) 1. land use regulation requiring autumn cover crops to take up N after harvesting	• as above
Netherlands	Policy Document on Manure And Ammonia (1995 and 1996)	0.20	Reduction of nutrient leaching	1. manure application limits - established in 1987 and nutrient balancing restricts commercial fertilizer use	• timetables to meet goals over the next 15-20 years
France	The National Environmental Plan (1990)	8.80	Reduction of water pollution	1. farm production costs could be affected if crop production activities or practices, are within the minimum distance requirements of protected areas or water sources	• primary objective is the reduction of water pollution
Australia	Murray-Darling Basin Initiative (1985) National Landcare Program (1992) National Heritage Trust (1996)	16.41	Degradation of soil and water	1. in general, public-funded land conservation initiatives and improved farming practices should stabilize and enhance long-term farm productivity on a national basis, which will have a positive financial impact of affected farms	• primary objective is the reduction of soil degradation, including the control of weeds

D. Step 2 - Quebec and Iowa hog production

Quebec is the largest hog producing province and Iowa is the largest hog producing state in North America. In 1996, total Quebec and Iowa inventories exceeding 3.3 million and 12.2 million hogs respectively, and this combined inventory represented over 22% of all hogs in North America. In terms of Canada, Ontario has the second largest hog inventory which is only slightly smaller than Quebec and consisted of 3.2 million hogs in 1996. In terms of the US, the Iowa hog industry is 30% larger than the industry in North Carolina (9.3 million hogs), which is the second largest hog producing state.

This section provides a review of agri-environmental issues in both Quebec and Iowa, related to the establishment of a large farrow to finish hog operation. This review is not meant to be exhaustive or a reflection of all that has been learned, tried and implemented at either a provincial or state level. On the contrary, a number of issues that have encountered in other provinces or states may not been experienced in either Quebec or Iowa, and are therefore not addressed in their current programs and policies. The comparison of Quebec and Iowa is summarized in Exhibit XII-9. The findings based on this information are as follows:

a) National requirements

In both Quebec and Iowa, a national environmental assessment is not required (at this time), in either Quebec or Iowa. This represents a significant cost saving contrast to European countries. However, in the case of Iowa, a federal waste disposal permit is required under the Clean Water Act, which is enforced by the Environmental Protection Agency.

b) Permits and manure restrictions

Various permits are required in both Quebec and Iowa. In both cases, a well-documented manure or fertilizer management plan is required within the process. In addition, the manure or fertilizer management plan can effectively limit manure application rates in both locations, and there is a need to accurately plan manure application in conjunction with nutrient use by planned cropping practices.

c) Off-farm manure disposal

Quebec and Iowa both allow off-farm manure disposal or sale, under a variety of conditions. This is essential to allow operations to comply with maximum manure application rates. It is important to note that this provision requires written agreement by landowners, if the operator plans to apply manure on nearby farms. Therefore, this provision is important in terms of locating a new hog operation, and neighbors can support or decline support for a new operation, based on their reaction to manure opportunities. As a result, new operations can be restricted from building in certain areas, if nearby farm land is not available for manure application purposes.

Exhibit XII-9

Establishment of large farrow to finish hog operation

Operational Issue	Quebec ¹⁵	Iowa
Major Legislation	Environment Quality Act (EQA) and subsequent 1997 regulations	- Animal Feeding Operation Act (1995) - National Environment Protection Act (1969)¹⁶ - Clean Water Act (1972)¹⁷
Environmental Assessment	not required	not required
Permit Process (excludes local permits)	<u>Province</u>: through ministry¹⁸ in accordance to the EQA and regulations (project approval from regional director), required for construction of new buildings, modifications to buildings or manure storage, expansion of herd size and manure conversion (e.g. solid to liquid) <u>Province</u>: compliance with administrative standards, technical rules and other conditions	<u>State</u>: permit required from the state Department of Natural Resources (DNR), prior to commencement of construction of building or manure storage facilities <u>State</u>: county construction permits are required¹⁹ <u>Federal</u>: under the Clean Water Act, confined animal feeding operation (CAFO) requires permit issued by EPA or state under the National Pollutant Discharge Elimination System (NPDES)
Location Factors	<u>mandatory</u> separation distances and regulations prohibits construction, modification, expansion and other changes within protection zones	<u>mandatory</u> separation distances based on the type of manure storage and animal weight capacity

¹⁵ The Agro-environmental Investment Assistance Program (AIAP) supports resource conservation and development. The programs contains four components to assist farm enterprises: (1) manure storage facilities, (2) manure management, (3) manure spreading machinery and equipment, and (4) agro-environmental advisory services.

¹⁶ The EPA spends over 50% of its total annual budget for assistance awards in the form of grants, cooperation agreements and interagency agreements. The Grants Information and Control System (GICS), is the official management information system for all EPA grant programs and tracks all grant applications.

¹⁷ The federal State Revolving Fund (SRF) provides various forms of assistance for nonpoint pollutant sources. As demand for funds increase, EPA indicates that improvements are necessary to ensure that priorities are addressed.

¹⁸ Ministère de l'Environnement et de la Faune.

¹⁹ State laws restrict zoning at the county level. However, recent county ordinances, which were first effective in Humboldt County in 1996, focus on public health protection and the majority have been upheld in recent court challenges. As a result, a number of counties now require the following: (1) public hearings, (2) financial assurances (insurance coverage or bonds), and (3) restrictions on manure application around wells.

Exhibit XII-9 (continued)
Establishment of large farrow to finish hog operation

Operational Issue	Quebec	Iowa
Management Plans	fertilization plan required (PAEF)²⁰	- all new operations require a manure management plan, which focuses on the minimization of potential surface and groundwater contamination (DNR approves) - plans must include written agreements of landowners if manure spread off-farm
Manure Storage	no assistance available²¹	must contain all manure between disposal periods (owner also responsible for the relocation and/or removal of tile drainage systems to eliminate direct waste flows to fresh water sources)²²
Manure Disposal	- no timing restriction if fertilizer management plan approved, unless land covered by snow²³ - fertilizer plan can limit manure levels - mandatory fertilizer records maintained in register for a minimum of two years	- manure levels are limited on land which receives manure under a manure management plan - manure must be incorporated within 24 hours of application - spray irrigation of manure regulated by DNR rules
Off-Farm Manure Disposal	requires recording information in register	requires submission of manure management plan and related details
Nuisance	right to farm legislation covers odour, noise, dust, smoke and light	provides defense against nuisance lawsuits provided all DNR permits obtained²⁴

²⁰

AIAP manure management assistance up to \$60,000 per farm.

²¹ New hog operations not eligible for AIAP manure storage assistance.

²² The Environment Quality Incentives Program (EQIP) established in the 1996 Farm Bill targets 50% of its funding to livestock producers. However, owners of large confined operations are not eligible for cost shared assistance for animal waste storage facilities.

²³ AIAP manure spreading assistance up to \$3,000 per farm.

²⁴ Toombs, Michael. Overview of Right to Farm in North America. Ontario Ministry of Agricultural, Food and Rural Activities. 1997.

Part 4

Findings and Suggested Future Research

XIII

Findings and further research

The objective of this section is to review the key findings of the report and provide suggestions for future agri-environment research.

A. Findings

The key findings are highlighted below. These findings are limited to the policies and programs reviewed in the previous chapters, and the qualitative analysis summarized in chapter XII.

- Each of the countries examined has some agri-environmental problems relating to air quality, soil quality, water quality and biodiversity. The degree of the individual problem varies from country to country, depending on the composition and structure of its agricultural sectors. Generally, those countries with small land areas and a high population density face greater environmental challenges (e.g. the Netherlands).
- Agri-environmental problems tend to be region specific and commodity sensitive.
- Agri-environmental problems are complex and can affect several medium. For example, excess nitrate in soil has an impact on water quality, which could also have a negative impact on biodiversity. This means that solving an environmental problem requires solutions to a range of issues, including the identification of the source(s).
- A wide range of policies and programs have been reviewed. A number of the policies and programs are designed to be very specific, while others are much broader in scope. The Netherlands and Denmark have policies and programs that tend to target the source of the problem and are mandatory in their implementation. This contrasts with Canada and Australia which tend to be broad in scope and are usually reliant on voluntary implementation. The major reason for the different designs include the degree of the problem, the availability of government support, the division of responsibility between regional and national governments, and other political, cultural and socio-economic factors.
- Producer and public awareness of potential agri-environmental problems can play an important role in policy and program development. In both the Netherlands and Denmark, there is a strong awareness amongst these groups on environmental issues. This

may be a result of a long history of competition between urban and rural land use. In Canada, Australia, and the US, producers and the public are becoming more aware and educated in relation to potential agri-environmental problems.

- A number of the programs in the countries examined deal with environmental problems resulting from livestock production. Hog producers in the Netherlands and Denmark are governed by a number of regulatory programs, which have affected their overall cost of production. In Canada and the US, hog producers are facing an increasing number of regulatory programs that will likely increase their overall cost of production. In specific regions, some of the recently implemented or upcoming regulations could impede the growth of this sector.
- Some agri-environmental policies and programs have significant financial impacts on producer and processor costs, which can ultimately affect a country's competitiveness. In recognition of this, certain countries have attempted to minimize the cost increases by providing incentives for the adoption of specific environmentally friendly practices.
- A number of the European, US and Australia programs could be applicable to Canada, especially those targeting manure handling and disposal. However, some of these programs are already being implemented at the provincial and municipal level in certain regions of Canada.

B. Suggested future research

1. National best practices - issues and opportunities

National best practices provide a relatively simple policy support mechanism to minimize potential manure-related pollution and environmental damage. The Canadian livestock industry is expanding in Canada, and a significant expansion of the hog industry is occurring in specific provinces, largely due to the development of new large-scale operations. In many cases, the large-scale operations are designed to use the latest manure management technology and monitoring systems. However, there is both a perception and potential that increased environmental damage will occur as a result of these large operations. Given that national manure management best practices do not exist, there are various reasons why such practices may be deemed appropriate, in that they can: (1) provide a consistent approach to manure nutrient management, which should help alleviate specific concerns throughout the country, (2) provide clearly documented requirements and plans for all stakeholders, and (3) provide a basis for efficient extension, planning, support and monitoring.

In this context, it is interesting to note that the issue of national manure standards is being discussed in the US and these discussions already have some support in the US Congress. American supporters of this concept indicate that EPA should maintain their

national regulatory role, and fully recognize that USDA is the only federal department with national staff to establish and assist with new national animal waste management standards. Supporters of national standards believe that livestock operations throughout the US should meet specific standards, in order to prevent pollution and environmental damage. Significant debate will certainly take place in terms of the size of operations, and the issue of variable requirements, within the overall national framework.

2. Agri-environmental payment versus support payments

Virtually all countries have provided some form of assistance to assist the agricultural industry in relation to manure management and other environmental issues. In this regard, it is recommended that a series of competitive studies be completed, with the objective of determining the level of support for each major sector with environmental issues. This information would be extremely useful, as Canada enters the next round of trade negotiation, since the environmental regulations and associated support levels have a direct impact on the competitiveness of a commodity. In this regard, it is important to note that the EU and its Member States have increased their agri-environmental expenditure in recent years and an evaluation of this support has recently been completed. One of the major conclusions within this report is that Member States need to separate programs intended to provide income support, from those programs that are designed to improve and maintain the quality of the rural environment.

3. The applicability of the mineral accounting system for specific regions of Canada

An integrated total farm approach can be extremely important in achieving long-term sustainable development goals, and a number of countries are using this concept in program design and implementation. One such example is the group of policies and programs used in the Netherlands to reduce mineral nutrient levels in surface and groundwater systems. In the past, most of the policies and programs have focused on reducing the phosphate levels in livestock manure. However, even integrated approaches have limitations. In a recent study by Statistics Netherlands, results showed that the amount of phosphate in animal manure decreased by almost 25% during the 1984 to 1996 period (from 254 million kilograms to 192 million kilograms). However, during the same period, the excretion of nitrogen increased by 3% (from 622 million kilograms to 641 million kilograms). The increase has been attributed to nitrogen within hog and poultry manure. On January 1, 1998, a new mineral accounting system came into effect in the Netherlands. This new system requires producers to account for all inputs and outputs of minerals on the farm (maximum allowable loss standards have been established, and fines are directly related to any surpluses that occur).

As the individual provinces and the federal government search for solutions to either prevent or reduce agri-environment problems resulting from intensive livestock production, it may want to consider the applicability of the mineral accounting system for certain regions of Canada.

Appendix A
Program Expenditure

Exhibit 1

NSCP	17.71	25.64	19.82	2.48	3.44			
ESI	4.86	2.96						
LMAP		0.06	9.42	12.77	0.26			
GP		0.64	5.95	18.28	35.03	37.36	36.22	
CARTT	0.71	0.73	0.73					
SWEEP	3.24	2.47	0.65					
CARD								10.00
NSWCP								5.00
PCP II		7.26	14.32	22.57	4.50			
GLWQA	1.20	1.20	1.20	1.20				
ERDA	9.80	8.30	5.30	3.60	0.10			
TOTAL	37.52	49.26	57.39	60.90	43.33	37.36	36.22	15.00

¹ Fiscal year is April 1 to March 31.

Source: Agriculture and Agri-Food Canada, Environment Bureau, May 24, 1996.

NSCP	National Soil Conservation Program	SWEEP	Soil and Water Environmental Enhancement Program
ESI	Environmental Sustainability Initiative	CARD	Canadian Adaptation and Rural Development
LMAP	Land Management Assistance Program	NSWCP	National Soil and Water Conservation Program
GP	Green Plan	PP II	Permanent Cover Program II
CARRT	Canada-Alberta Agreement on Soil, Water and Cropping Research and Technology Transfer	GLWQA	Great Lakes Water Quality Agreement
		ERDA	Economic Regional Development Agreement

**Conservation expenditure for selected US programs
fiscal years 1990 - 97⁽¹⁾ (C\$Million)**

Conservation expenditure for selected US programs								
fiscal years 1990 - 97 ⁽¹⁾ (C\$Million)								
Agricultural Conservation Program (ACP)								
T.A., Extension, Admin	13	12	13	14	16	8	6	6
Cost-sharing for practice	221	197	217	236	251	129	96	97
Sub total	234	209	230	251	267	137	102	103
Conservation Reserve Program (CRP)								
T.A., Extension, Admin	19	7	14	12	6	7	9	29
Cost-sharing for practice	139	47	48	41	20	5	34	91
Rental and Easement Payments	1,642	1,822	1,957	1,953	2,368	2,341	2,386	2,526
Sub total	1,801	1,875	2,019	2,006	2,395	2,354	2,429	2,647
Great Plains Conservation Program (GPCP)								
T.A., Extension, Admin	9	10	11	12	13	12	0	0
Cost-sharing for practice	15	19	20	21	22	8	0	0
Sub total	24	29	31	33	35	21	0	0
Wetland Reserve Program (WRP)								
T.A., Extension, Admin.	0	0	0	6	5	12	8	23
Cost-sharing for practice	0	0	0	0	10	14	11	28
Rental and easement payments	0	0	0	6	119	108	79	207
Sub total	0	0	0	12	134	132	98	258
Colorado River Salinity Control Program								
T.A., Extension, Admin.	5	7	7	7	8	5	0	0
Cost-sharing for practice	7	10	11	11	11	1	3	3
Sub total	12	17	18	18	19	6	3	3
Rural Clean Water Program (RCWP)								
T.A., Extension, Admin.	1	1	0	0	0	0	0	0
Cost-sharing for practice	0	0	0	0	0	0	0	0
Sub total	1	1	0	0	0	0	0	0

⁽¹⁾ Fiscal year is October 1 to September 30.

⁽²⁾ Appropriation by Congress.

Based on Administration's request prior to passage of the 1996 Farm Act. Does not include new programs created by the 1996 Act.

Source: USDA, "Agricultural Resources and Environmental Indicators, 1996-97," Economic Research Service, Natural Resources and Environment Division, Agricultural Handbook No. 712.

**Conservation expenditure for selected US programs
fiscal years 1990 - 97⁽¹⁾ (C\$Million)**

	1990	1991	1992	1993	1994	1995	1996	1997
Water Bank Program (WBP)								
T.A., Extension, Admin.	14	15	21	22	10	0	0	0
Rental and easement payments	14	15	21	22	10	0	0	0
Sub-total	15	16	22	24	11	1	0	0
Small Watershed Program (planning)								
T.A., Extension, Admin.	10	11	12	12	15	14	8	11
Public works project activities	96	95	109	131	146	0	46	55
Sub-total	107	105	120	143	161	14	54	66
Resource Conservation & Development (RC&D)								
T.A., Extension, Admin.	27	28	32	39	39	42	40	40
Public works project activities	7	7	3	6	3	0	0	0
Sub-total	34	35	35	45	42	42	40	40
Watershed Protection/Flood Prevention								
T.A., Extension, Admin.	74	81	90	104	107	96	82	105
Public Works Project Activities	19	15	26	31	31	0	8	0
Sub-total	93	95	116	135	138	96	90	105
Forestry Incentives Program (FIP)								
T.A., Extension, Admin.	1	1	1	2	2	1	1	1
Cost-sharing for practice	12	14	14	14	16	8	8	8
Sub-total	13	15	15	16	18	9	9	9
Emergency Conservation Program (ECP)								
T.A., Extension, Admin.	21	10	12	2	1	2	0	0
Cost-sharing for practice	21	11	12	54	33	29	0	0
Sub-total	42	21	24	56	34	31	0	0
Conservation data and Research								
River Basin Surveys	14	15	16	17	18	18	11	16
Soil Surveys	80	80	88	94	101	99	104	107
Plant Materials Centers	8	9	10	10	12	11	12	12
Others	325	347	388	412	453	451	427	435
Sub-total	428	451	502	534	585	580	555	570
TOTAL of Selected Programs	2,786	2,859	3,122	3,271	3,839	3,424	3,381	3,80

(1) Fiscal year is October 1 to September 30.

(2) Appropriation by Congress.

Based on Administration's request prior to passage of the 1996 Farm Act. Does not include new programs created by the 1996 Act.

Source: USDA, "Agricultural Resources and Environmental Indicators, 1996-97," Economic Research Service, Natural Resources and Environment Division, Agricultural Handbook No. 712.

**Status of selected USDA conservation programs
fiscal 1990-1995⁽¹⁾ (C\$Million)**

Agricultural Conservation Program							
Number of participants ('000)	123.8	123.9	120.2	114.9	122.4	84.8	
Average assistance per participant (C\$)	1,895	1,684	1,917	2,179	2,273	2,297	
Great Plains Conservation Program							
Total active contracts (whole farm units)	5,443	5,779	6,336	6,761	6,761	7,419	
New contracts during year	971	1,047	1,185	1,129	1,166	483	
Acres under active contracts (million)	16.6	15.1	19.4	19.9	15.7	15.8	
Average cost/new contract (C\$'000)	26	26	25	28	30	30	

Colorado River Salinity Control Program						
Number of participants	172	214	349	527	517	597
Average assistance per participant (C\$'000) ⁽²⁾	71	79	51	34	38	52
Conservation Loans and Easements						
Number of soil & water loans	247	206	138	123	157	0
Value of soil & water loans	7.2	6.3	3.3	3	5.1	0
Conservation easements	388	114	84	120	167	69
Acres in easements	33,280	10,310	8,340	17,580	24,380	5,690
Number of properties transferred for	9	141	73	79	54	56
Acres of properties transferred for conservation	8,954	50,447	21,692	21,090	13,392	13,351
Small Watershed Program						
Projects authorized for planning	18	11	35	33	33	17
Projects authorized for installation	19	23	11	22	22	17
Obligations for planning	10	10	11	12	15	14
Obligations for installation	153	161	175	205	246	98
Resource Conservation and Development Program						
Number of active areas	194	209	236	250	275	277
State and local funding	127	184	159	97	60	28
State and local funding per Federal dollar	4.67	6.15	4.89	2.99	17.81	19.15
Emergency Conservation Program						
Number of farms assisted	8,958	6,877	4,907	4,929	12,515	9,227
Acres served (million)	1.1	1.0	1.0	1.4	0.9	0.9
Average assistance per acre (C\$) ⁽²⁾	20.03	10.31	13.35	40.09	56.17	45.14
Conservation Technical Assistance (CTA)						
Cooperators assisted (million)	1.8	1.2	1.2	1.2	1	0.7
Cooperators applying practices (million)	0.4	0.9	0.5	0.5	0.4	0.3
Resource management system acres (million)	27.4	18.4	18	15.9	16.5	17.8
Acres serviced by CTA (million)	60.7	59.6	59.6	62.1	57.2	37
Extension and Education						
Water Quality Program FTE ⁽³⁾	N/A	N/A	698	711	748	764
Sustainable Agr. Initiative FTE	N/A	N/A	634	635	623	640

⁽¹⁾ Fiscal year is October 1 to September 30.

⁽²⁾ Appropriation by Congress.

⁽³⁾ Based on Administration's request prior to passage of the 1996 Farm Act. Does not include new programs created by the 1996 Act.

Source: USDA, "Agricultural Resources and Environmental Indicators, 1996-97," Economic Research Service, Natural Resources and Environment Division, Agricultural Handbook No. 712.

Exhibit 5 shows EU's expenditure on agri-environmental programs since the introduction of the Accompanying Measures (Regulation 2078/92/EEC). This Exhibit indicates that Germany, Spain, France, Portugal and the United Kingdom were the first to establish agri-environmental programs. For most Member States, there was a delay of two or more years before programs were implemented.

Exhibit 5

EU expenditure on agri-environment program, 1993-1997 (C\$Million)

Member State	1993	1994	1995	1996	1997	Total
Belgium				3	3	5
Denmark		3	5	10	15	32
Germany	61	204	370	385	505	1,524
Greece				3	17	18
Spain	13	23	27	55	90	208
France	111	121	176	198	239	845
Ireland			32	71	166	271
Italy			90	70	558	717
Luxembourg					7	7
Netherlands	2	2	7	13	20	42
Austria				898	438	1,336
Portugal		20	65	66	96	246
Finland				427	237	662
Sweden				71	138	209
United Kingdom	17	12	33	43	60	163
EU15	204	383	805	2,309	2,583	6,285

Exchange rate: 1 C\$ = 0.6024 ecu

Source: Commission of the European Communities, "Application of Council Regulation (EEC) No. 2078/92 on Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside," Report from the Commission to the Council and the European Parliament, December 1997.

For most Member State, 1996 and 1997 were the first full years of implementation for a number of the programs. Exhibit 6 provides an estimate of EU and Member States' expenditure on agri-environment programs in 1997.

Exhibit 6

Total 1997 EU expenditure (C\$Million)

Member State	1996	1997	1998
Belgium	3	2	5
Denmark	15	15	28
Germany	505	206	711
Greece	17	5	22
Spain	90	30	120
France	239	239	476
Ireland	166	55	222
Italy	558	372	930
Luxembourg	7	7	15
Netherlands	20	18	38
Austria	440	405	845
Portugal	96	32	128
Finland	237	237	473
Sweden	138	138	276
United Kingdom	60	56	116
EU15	2,585	1,818	4,403

Exchange rate: 1 C\$ = 0.6024 ecu

Source: Commission of the European Communities, "Application of Council Regulation (EEC) No. 2078/92 on Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside," Report from the Commission to the Council and the European Parliament, December 1997.

Approximately 1.4 million agreements were signed by EU farmers by the mid-year in 1997, covering 17% of all holdings and persons employed in agriculture (see Exhibit 7).

Exhibit 7
Number of participants¹

Belgium	1,242	102	1
Denmark	8,193	114	7
Germany	554,836	1,197	46
Greece *	1,839	780	0
Spain	29,599	1,119	3
France	177,695	1,080	16
Ireland	23,855	140	17
Italy **	63,841	1,489	4
Luxembourg	1,922	6	32
Netherlands	5,854	243	2
Austria***	180,000	267	67
Portugal	125,479	507	25
Finland	91,509	156	59
Sweden	68,969	124	56
United Kingdom	21,482	533	4
EU15	1,356,315	7,857	17

* 1995 data ** 1996 data *** Estimated

¹ Number of participants as of April 15, 1997.

Source: Commission of the European Communities, "Application of Council Regulation (EEC) No. 2078/92 on Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside," Report from the Commission to the Council and the European Parliament, December 1997.

The Agreements signed by EU farmers by April 15, 1997 covered 22.3 million hectares, or 17% of the utilized agricultural area (UAA). The most widespread programs were in Austria, Luxembourg and Finland with over 70% of UAA (see Exhibit 8).

Exhibit 8

EU area under agri-environmental programs

Belgium	5	17	139	1,366	1
Denmark	28	94	309	2,715	3
Germany	711	6,353	148	17,344	37
Greece	22	12	n/a	5,741	0
Spain	120	532	134	25,092	2
France	476	5,725	70	30,277	19
Ireland	222	801	244	4,444	18
Italy**	930	977	n/a	17,294	6
Luxembourg	15	97	149	127	76
Netherlands	38	31	432	1,981	2
Austria***	845	2,500	232	3,449	72
Portugal	128	606	227	3,981	15
Finland	473	2,000	206	2,605	77
Sweden	276	1,561	259	3,438	45
Unite Kingdom	116	1,322	91	15,852	8
EU15	4,403	22,628	194	135,706	17

* 1995 data ** 1996 data *** Estimated

Exchange Rate: 1 Cdn\$ = 0.6024 ECU

Source: Commission of the European Communities, "Application of Council Regulation (EEC) No. 2078/92 on Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside," Report from the Commission to the Council and the European Parliament, December 1997, page 9.

Netherlands

The Central Bureau Statistics (CBS) survey of the costs and financing of environmental control includes most of the measures for protecting, restoring and improving the state of the environment. The survey excluded measures for which costs are recovered through revenues from by-products or savings on personnel, raw materials or natural resources. Costs of own environmental activities, transfers paid and received (e.g. environmental levies, subsidies, payments for environmental activities contracted out) and net annual environmental costs are detailed separately by economic sector. The costs of own environmental activities include labour costs, purchase of goods and services, interest and depreciation on capital goods used for environmental activities and the additional expenses involved in using environmentally-friendly products (e.g. low sulphur fuel). The costs are broken down in the survey into the following categories: water, air, soil (including groundwater), waste, noise and general. The latter category includes the costs of measures which could not or should not be ascribed to another category. Exhibit 9 provides a summary of the agri-environmental programs.

Exhibit 9

Netherlands - net environmental costs to farms (C\$Million)

	1992	1993	1994
Total Cost of Environmental Activities	751	1,052	1,211
Subsidies	157	209	227
Levies	348	257	291
Net Cost for Environmental Activities	940	1,099	1,273
Net Cost as % of product value	1.1%	1.2%	1.3%
Net Cost as % of gross added value	2.3%	2.7%	2.6%
Net Cost as per unit of labour ⁽¹⁾	3,879	4,588	5,455
Net Cost excluding levies for fuel	806	1,099	1,273

⁽¹⁾ Per unit of labour is equal to 2000 hours per years.

Source: Van Riessen, Jaap, "Milieukosten van de landbouw 1993 en 1994, Kwartier Milieu, Centraal Bureau voor de Statistiek, 96/3.

**Table 100: Netherlands government expenditure on agri-environmental programs⁽¹⁾
(C\$Million)**

	1992	1993	1994
Water	25.4	28.6	22.4
Air	176.0	140.4	104.6
Soil	515.4	406.9	562.9
Waste	2.1	2.4	5.0
Noise	2.1	2.4	5.0
Unallocated	21.2	26.2	19.9
TOTAL	742.3	606.8	719.9

⁽¹⁾ Need to verify translation of expenditure.

Source: Van Riessen, Jaap, "Milieukosten van de landbouw 1993 en 1994, Kwartber Milieu, Centraal Bureau voor de Statistiek, 96/3.

Exhibit 11

Natural Heritage Trust Funding								
Vegetation								
National Vegetation Initiative								
Farm Forestry								
Rivers								
Murray-Darling 2001								
National Rivercare Initiative								
National Wetlands Program								
Tasmanian Regional Environment								
Remediation Program								
Biodiversity								
National System of Reserves								
Endangered Species Program								
Land Resources								
National Landcare Program ⁽²⁾								
National Land and Water Audit								
National Weeds Strategy								
National Feral Animal Control Strategy								
Property Management Planning								
TOTAL								

Fiscal year is July 1 to June 30.

$$\text{Exchange Rate} = \text{A\$}1.076 = \text{C\$}1.00$$

(1) Estimated expenditure.

(7) Includes landcare tax measures.

Source: 1997/98 Budget Speech

Appendix B
Legislation By Country

Appendix B: **Summary of Major Legislation By Country**

Type of Legislation	Canada	United States	European Union	Denmark	Netherlands	France	Australia
Environmental Protection	4	4		4	4	4	4
Environment Assessment	4		4	4			
Air Pollution					4	4	4
Water (safe drinking, fresh water)	4	4	4	4	4	4	4
Chemical/Toxic Substance Control		4		4		4	
Pest Control	4	4					
Plant Protection	4			4			4
Endangered Species	4	4					4
Wetlands Conservation		4					
Wildlife Protection	4						4
Organic Foods		4					
Biotechnology		4				4	
Nature Protection or Conservation			4	4	4	4	

A. Major legislation

1. Canadian Environmental Protection Act (CEPA)

The Canadian Environmental Protection Act (CEPA) was enacted in 1988. After a series of consultation, a new CEPA Act was drafted in 1996. Unfortunately, it did not make it through the legislation process during the last parliament session. It is anticipated that the bill will be put forward in this new Parliament.

The proposed new CEPA focuses on pollution prevention, and protection of the environment and the health of Canadians from toxic substances. CEPA incorporates the advancement made in environmental law, and concepts such as sustainable development and pollution prevention. It encompasses pollution prevention, managing toxic substances, clean air and water (fuels, vehicle emissions, international air and water pollution), controlling pollution and wastes (land-based sources of marine pollution, disposal at sea, movement of hazardous wastes and recyclable and of non-hazardous wastes, environmental matters related to emergencies, biotechnology, federal government operations and federal and Aboriginal lands, enforcement, information gathering, objectives, guidelines, and codes of practice, and public participation.

2. The Canadian Environmental Assessment Act

The Canadian Environmental Assessment Act was proclaimed on January 19, 1995. The three primary objectives of this Act include: 1) ensure environmental effects of projects receive careful consideration, 2) encourage actions that promote sustainable development, and 3) ensure the public has an opportunity to participate in the environmental assessment process.

The Act sets out the responsibilities and procedures for environmental assessment of projects involving the federal government. It also establishes a clear and balanced process to the environment assessment process. It allows the responsible authorities to determine environmental effects of projects early in their planning stage. The Act applies to projects for which the federal government holds decision-making authority, whether as proponent, land administrator, source of funding or regulator. It includes proposals for policies or programs considered by Cabinet. Each ministry is responsible for the implementation of this Act (the Environmental Bureau within Agriculture and Agri-Food Canada is responsible for implementing this Act).

While this Act has an impact on air, water, soil and biodiversity, it targets government

actions, but not individual agriculture and agri-food enterprises, unless the federal government is involved in the enterprise.

The implementation of this Act has resulted in three Federal-provincial agreements relating to environmental assessment. These agreements allow the harmonization of environmental assessment studies on projects. Federal-Provincial Agreements concerning Environmental Assessment include:

Canada-Alberta Agreement for Environmental Assessment Cooperation,

Canada-Manitoba Agreement for Environmental Assessment Cooperation, and

Canada-British Columbia Agreement for Environmental Assessment Cooperation.

3. Canada Water Act

This Act was proclaimed on September 30, 1970, and revised 1985. The Act provides a framework for joint federal-provincial management of Canada's water resources, including research and the planning and implementation of programs relating to the conservation, development and utilization of water resources. Key provisions in the Act include: 1) the establishment of federal-provincial consultative arrangements for water resource matters and for cooperative agreements to develop and implement plans for the management of water resources, and 2) federal-provincial management agreements where water quality has become a national concern. It permits the joint establishment and use of federal or provincial incorporated agencies to plan and implement approved water quality management programs.

4. Canadian Food and Drugs Act

The Canadian Food and Drugs Act regulates the manufacturing, export and importation of food drugs in Canada. Division 15 of the Food and Drugs Regulations sets maximum residue limits for agricultural chemicals. These levels limits chemical residues to levels that would not pose a health hazard to consumers. The permitted level of pesticide residues varies from no detectable residue to several parts per million (ppm), depending on the use patterns and character of the pesticide concerned. For pesticides not requiring a specific minimum residue level, a general limit of 0.1 ppm has been established.

5. Pest Control Products Act

This Act regulates products used to control pests and organic functions of plants and animals. It sets the parameters for the manufacturing, storing, distribution or use of any control products. It prohibits the packaging, labeling and advertising of any control products in a manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character, value, quantity, composition, merit or safety.

The Pest Management Regulatory Agency (PMRA), established within Health Canada on April 1, 1995, is responsible for the implementation of this Act. The long-term health of agriculture and other sectors is becoming an increasing concern. The Agency has created an Alternatives Division to develop efficient and effective approaches to fostering sustainable pest management practices. Government funding for the Agency will be \$12 million in 1997.

6. Plant Protection Act

This Act controls the importation, exportation and spread of pests injurious to plants. It also provides for the control and eradication of pests, and the certification of plants and other things. While this Act is important in protecting the biological diversity of Canadian plants, it does not necessary impose additional production costs to producers.

7. Wild Animal and Plant Protection and Regulation of International and Inter-provincial Trade Act (WAPPRIITA)

This Act controls the trading of wildlife and plants, and prohibits trafficking of endangered species. For less threatened species, trade will be monitored and regulated through a permit system. It protects Canadian ecosystems from the introduction of undesirable species that could be detrimental to existing ecosystems.

The Act also gives national support to provincial and territorial wildlife management programs. It complements existing provincial and territorial legislation and will improve Canada's compliance with international agreements. It supports the efforts of other countries to conserve and protect species, particularly endangered ones. The goal of this Act is the conservation of wild animals and plants.

B. Policies and programs

1. The Federal Policy on Wetland Conservation

Government Department	Environment Canada
Title	<i>The Federal Policy on Wetland Conservation</i>
Enactment Date	1991
Primary Objective	Promote the conservation of Canada's wetlands to sustain their ecological and socio-economic function, now and in future.
Targeted Issues	Conservation of wetlands.
Description and Operational Guidelines	Key strategies of Policy: Develop public awareness and understanding of wetland resource and encourage public participation. Commit all federal departments to the goal of no net loss of wetland functions on federal lands and water, areas affected by the implementation of federal programs, and where federal activities affect wetlands designated as ecologically or socio-economically important to a region. Encourage recognition of wetland functions in natural resource conservation and development strategies, such as those for forests, minerals, <u>agricultural lands</u>, and <u>water</u>. Ensure the hydrological functions of wetlands, such as groundwater recharge, water flow regulation and water purification are reflected in federal water management activities. • Encourage the use of watersheds, as appropriate spatial units, for implementation of integrated water management policy and programs. Develop and amend, where necessary, new and existing federal policies and legislation so as to enhance wetland conservation within federal areas established for ecosystem conservation purposes. Encourage the development of practices that integrate wetland functions into natural resource allocation decisions.
Areas of concern: water, soil, air, biodiversity grain and hog production	Wetlands serve many ecological and socio-economic functions including: water recharge, which provides natural purification and storage of freshwater for humans and wildlife; natural shoreline protection from wave action and erosion; preservation of biodiversity of species; nutrient source for connected waters; soil and water conservation; agriculture - in their natural and/or managed states, wetlands support the soil base for market garden crops and production of other specialty crops such as berries and wild rice; and a rich and varied landscape serving as a valued aesthetic resource.

Note: The Federal Policy on Wetland Conservation complements the goals and objectives of the North American Waterfowl Management Plan, the Federal Water Policy, the Fisheries and Oceans Canada Policy for the Management of Fish, the Great Lakes Water Quality Agreement, the International Ramsar Convention, the Wildlife Habitat Canada "Common Ground" Initiative, and the Wildlife Policy for Canada.

2. Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity

Government Department	Environment Canada
Title	<i>Canadian Biodiversity Strategy</i>
Enactment Date	Released 1995
Primary Objective	A guide to implementing the Biodiversity Convention in Canada.
Targeted Issues	Preservation of biodiversity.
Description and Operational Guidelines	Strategic directions specific to agriculture: Assess major agricultural policies and programs to ensure that ecological, economic, social and cultural objectives are considered. Maintain, adjust or develop economic incentives that promote the conservation of biodiversity and sustainable use of biological resources on agricultural lands. Inventory and evaluate genes, populations, species and ecosystems for conservation and identification of species for use as biocontrol agents. Develop and use agricultural pest-control products and integrated pest management approaches to minimize impacts on non-target ecosystems. Conserve biological resources that are essential to agriculture, including domesticated animals, plants, and microbial germplasm, and their wild relatives. Develop and implement programs that promote and facilitate the coexistence of wild flora and fauna, and other wild organisms and their habitats in agricultural landscapes. Facilitate the adoption of environmentally sustainable farm practices, including practices leading to the reduction of soil erosion, surface and ground water contamination and air pollution. Encourage producers to develop farm management plans. Facilitate the sharing of experiences and expertise among farmers to promote sustainable management practices. Develop policies or programs that conserve biodiversity. Identify and conserve areas that support native species and communities. Maintain or develop conservation mechanisms to support the conservation and sustainable use of biological resources essential to agriculture.
Areas of concern: water, soil, air, biodiversity grain and hog production	Primarily biodiversity, which has an impact on soil and water.

3. Strategy for Environmentally Sustainable Agriculture and Agri-food Development

Government Department	Agriculture and Agri-Food Canada (AAFC)
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Title	<i>Strategy for Environmentally Sustainable Agriculture and Agri-food Development</i>
Enactment Date	1997
Primary Objectives	Provides a framework for integrating sustainable environmental considerations into policies and programs.
Targeted Issues	Incorporating sustainable environmental considerations into daily government business.
Description and Operational Guidelines	In Canada's new environmental agenda, "A Guide to Green Government", each department is required to develop sustainable development strategies. This is AAFC's response to this requirement. This strategy sets out four directions for agriculture and agri-food sectors. These include: - increase understanding of environmental issues; - promoting environmental and resource stewardship; - developing innovations and solutions; and - seizing market opportunities. A set of priorities and action plans were established for each of the directions.
Areas of concern: water, soil, air, biodiversity grain and hog production	The goal of this strategy is long-term sustainable agriculture and agri-food development. To achieve this goal, all four areas of concern will require review and action plans.

4. National Soil and Water Conservation Program (NSWCP)

Government Department	Agriculture and Agri-Food Canada (AAFC)
Title	<i>National Soil and Water Conservation Program (NSWCP)</i>
Enactment Date	May 1997
Primary Objective	A two-year initiative to provide funding for a program in each province addresses priority environmental sustainability issues facing the agriculture and agri-food sector.
Targeted Issues	Conservation of soil and water in a sustainable environment.
Description and Operational Guidelines	NSWCP is established under the Canadian Adaptation and Rural Development Fund to assist the government and its agricultural industry partners to implement Canada's sustainable development strategy. In each province, a Soil and Water Conservation Program will be developed that addresses the priority environmental sustainability issues of the region. Initiatives will fall into three program areas that are linked to AAFC's sustainable development strategy including: Stewardship technology transfer/research and development, market opportunities development, and increasing understanding and awareness. NSWCP will be delivered by industry led Adaptation Councils in BC, Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. In Newfoundland, the Newfoundland and Labrador Federation of Agriculture is delivering the program. In the Prairie provinces, AAFC's Prairie Farm Rehabilitation Administration will deliver the program. Eligibility criteria will vary by province, based on the key environmental sustainability issues to be addressed.
Areas of concern: water, soil, air, biodiversity grain and hog production	Soil conservation and water quality

United States

A. Major legislation

1. National Environmental Protection Act (NEPA)

The National Environmental Protection Act was passed in 1969 and has been amended regularly since. The Act is far reaching and its main objective is to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate health and welfare. In addition, the Act aims to "enrich the understanding of the ecological systems and natural resources" and to establish a Council on Environmental Quality. The Environmental Protection Agency is the lead agency in implementing NEPA.

NEPA requires environmental impact statements for major projects which must address the environmental costs and benefits of project, optimal locations and siting effects, and use of best technological measures to minimize environmental risk. The Act does not have a significant impact on most farmers unless a large scale facility, such as a food processing facility is proposed.

2. Endangered Species Act (ESA)

The Endangered Species Act was passed in 1973 and is administered by the Department of the Interior, Fish and Wildlife Service. Other Acts aimed at protecting wildlife include; the Lacey Act, Migratory Bird Treaty Act, National Wildlife Refuge Administration Act but these are not as far-reaching as the ESA because they do not preserve "critical habitat". However, all of these Acts may have some effect on the activities of farmers and ranchers.

The Act prohibits activities affecting endangered or threatened plants and animals and their habitats. Section 9 of the Act applies to private landowners. Farmers may be prohibited from destroying "pests" (animals causing economic losses to the farm or ranch) or be required to modify areas which are critical habitat for endangered species. Section 7 concerns "Interagency Cooperation" and requires that all government agency's actions abide by the legislation (e.g. USDA). All activities involving endangered or threatened species require permits from the Fish and Wildlife Service. Permits may be issued for a number of activities including: 1) enhancement of propagation or survival of the species, 2) incidental taking, 3) economic hardship situations involving endangered species, 4) zoological, horticultural, or botanical exhibition, and 5) educational purposes. Permits are not required for interstate or foreign commerce, import, and export of seeds from artificially propagated specimens

of threatened plants. Fines of up to \$100,000 and one year of imprisonment can be imposed on individuals and organizations can be fined up to \$200,000. Civil penalties range from \$500 to \$10,000.

Habitat protection has caused much controversy, mainly from industry (e.g. logging, mining, farming, ranching) who claim the Act carries too much weight. Opponents of the Act invoke the concept of "property rights". There is also controversy over what is defined as "species", what constitutes "endangered", and how to measure and preserve critical habitat.

3. Toxic Substances Control Act (TSCA)

The Toxic Substances Control Act was passed in 1976 to supplement the Clean Air Act and the Toxic Release Inventory. The primary objective of the Act is to regulate, test, and screen all chemicals imported or produced in the US. Any chemical in the market place must be tested for toxic effects before commercial manufacture and tracking and reporting of chemicals that pose health and environmental hazards is required. The Act also provides authorization for toxic material cleanup.

TSCA operates according to two general policies: 1) primary responsibility for developing data on environmental effects of chemicals is placed on industry and 2) government has authority to prevent unreasonable risk, which should be exercised so as not to impede unduly or create unnecessary economic barriers to technological innovation (Findlay and Farber, 1996, p 190).

With regards to agriculture, TSCA regulates all chemical used in agriculture. As of 1997 "microbial products of biotechnology" are also regulated under TSCA. This applies only "new" (formed by combining intergeneric genetic material) which are used for commercial purposes and biofertilizers and organisms used for bioremediation. A Microbial Commercial Activity Notice and a TSCA Environmental Release Application is required before using these organisms

In general, TSCA operates (as FIFRA) in a cost/benefit framework, balancing environmental and economic costs.

4. Resource Conservation And Recovery Act (RCRA)

The Act was passed in 1976 and is administered by EPA. The primary objective of the Act is to prevent accidental or unregulated discharges of pollutants by creating a regulatory program to control future water treatment, storage and disposal activities. The Act also imposed civil liabilities on contributors to facilities which currently present an 'imminent and substantial endangerment' to health and environment. With regards to agriculture, the Act mainly affects the use, storage and disposal of chemicals on farm and ranchlands by requiring records of all hazardous substances from production to disposal.

5. North American Wetlands Conservation Act

The North American Wetlands Conservation Act was passed in 1989. Participation is voluntary and the primary objective of the Act is to encourage voluntary, public-private partnerships to conserve wetland ecosystems. The Act establishes an infrastructure and provides a source of funding to conserve wetlands, which results in the procurement of a real property interest in, or the restoration, management, or enhancement of a wetland ecosystem to benefit wildlife. Anyone can apply for a grant under the Act at any time, but certain criteria must be met to have a project funded. Congress elected to spend \$9 million in 1995 and \$6.75 million in 1996. Up to \$30 million may be appropriated in 1997 and 1998 fiscal years.

6. Organic Foods Production Act

The Organic Foods Production Act was promulgated in 1990 (under the Farm bill) and is administered by USDA. The objective of the Act is to establish national standards for the production and handling of foods labeled as "organic". The Act allows for more restrictive state standards if approved by USDA. However, states cannot discriminate against out-of-state products that meet the federal standards.

7. Pollution Prevention Act

The Pollution Prevention Act was promulgated in 1990 and the EPA is the lead agency. The primary objective of the Act is the reduction and prevention of pollution at the source whenever feasible. Pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible and pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible. Disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.

The Act provides for regulations and compliance programs, state and local partnerships, strengthening of the national network of state and local pollution prevention programs, and seeks to integrate pollution prevention into state and local regulatory, permitting, and inspection programs supported with federal funds. Programs and policies related to this Act include the AG-STAR Program, Ruminant Livestock Methane Program, Pesticide Environmental Stewardship Program, and Agriculture In Concert With The Environment (ACE).

8. Safe Drinking Water Act

The Safe Drinking Water Act is a federal Act and was amended in 1996, but it is administered primarily through state and local governments. The overall goal of the Act is to ensure minimum national health standards for drinking water.

The Act requires control of chemical discharges into water supplies and also regulates underground injection of waste into aquifers, which affects the practice of placing irrigation return water underground through dry wells. The EPA can withhold assistance

if standards are not met.

In terms of agriculture, farmers and ranchers are considered as a public water supply if they have over fifteen service connections or regularly service a minimum of twenty-five people over a period of at least sixty days.

With respect to groundwater contaminants, a major issue is "acceptable levels". Currently, EPA establishes maximum contaminant level goals (MCLG) which may differ from the maximum contaminant levels (MCL) actually enforced (Pedersen and Meyer, 1995, p. 403).

9. Food Quality Protection Act (FQPA)

The Food Quality Protection Act was passed in 1996 and amends two major pesticide laws: the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and Federal Food, Drug, and Cosmetic Act (FFDCA). This Act attempts to resolve inconsistencies between FIFRA and FFDCA by regulating all pesticides on a single "health based standard".

This Act expedites approval of safer pesticides and creates incentives for the development and maintenance of effective crop protection tools, and periodic re-evaluation of pesticide registrations and tolerances. Explicit consideration of "pesticide benefits" is required when setting tolerance levels. EPA can restrict or prohibit the use or sale of any pesticide if there is reason to believe it causes unreasonable adverse effects on human health.

In 1997-1999, \$12 million was provided for increased FDA monitoring of pesticide levels in foods. FQPA provides for the collection of \$14 million/year to support the current pesticide re-registration program and processing of applications, and an additional \$2 million/year is to be collected in 1998, 1999 and 2000.

The FQPA also amends the Delaney Clause by requiring pesticide exposures to be shown safe for infants and children. Repeal of the Delaney clause effectively raises pesticide tolerances to one in a million. The controversial Delaney clause (originally under FFDCA Section 409), prohibited the approval of food or feed tolerances for pesticide residues in processed food or animal feed if the pesticide is found to induce cancer in humans or animals, regardless of the level of risk. Under FQPA, pesticide levels in all foods must be shown safe (specifically for infants and children; and not just risk of cancer). In this sense, regulations were strengthened. However a new standard for tolerances to pesticides was set as "reasonable certainty of no harm" as defined as "one in a million". This standard can be waived if EPA considers it to cause "significant disruption in domestic production".

10. Biotechnology regulations

Regulations on genetically modified organisms (GMO) aim to protect soil and water, if the GMO is classified as a pesticide and also protect biodiversity, by preventing

inadvertent spread of organism or genetic material.

EPA regulates genetically modified microorganisms under NEPA, ESA, and TSCA. Since 1995, EPA has been proposing to regulate plants with genetically engineered pesticides under FIFRA. This proposal is still under review and has received much criticism from industry and biotechnology sectors who see it as a case of over-regulation. USDA regulates plants and animals through APHISs (Animal and Plant Health).

11. Fund for Rural America

the Fund for rural America focuses on rural research and development, including projects which conserve and enhance natural resources. Rural development funding can be used for rural business enterprise grants, direct loans, grants to water and waste water projects, distance learning, tele-medicine loans and grants, self-help housing, and rural housing preservation.

The research grant program is for research directed to increasing international competitiveness, conserve and enhance natural resources, develop new crops, new crop uses, new agricultural applications of biotechnology, value added processing and preservation of plant and animal germplasm. The research funding could support research on water and soil conservation.

B. Policies and programs

1. Wetlands Reserve Program (WRP)

Government Department	<i>Administered by USDA—NRCS and FSA.</i>
Title	<i>Wetlands Reserve Program</i>
Enactment Date	1990, amended 1996
Keywords	wetlands, water quality
Primary Objectives	Aims to restore and protect wetlands on private land through easements; overall goal is no net loss of wetlands. Improve water quality by filtering sediments and chemicals; reduce flooding; recharge ground-water; protect biological diversity (by improving fish and wildlife habitats).
Targeted Issues	Preservation and protection of wetlands.
Description and Operational Guidelines	Federal voluntary program providing financial incentives to enhance wetlands in exchange for retiring marginal agricultural land. 1996 maximum acreage is 975,000 acres in total. Producers retains private ownership and may apply for limited use (e.g. recreational use, cutting hay, grazing livestock, harvesting timber) if compatible with restoration and enhancement plan. Landowner and NRCS develop suitable conservation plan for local conditions. Eligible land must be privately owned, and be restorable and suitable for wildlife benefits. Producers are offered three payment options: <u>Permanent Easement</u> - conservation easement in perpetuity. Easement payment will be the lesser of the agricultural value of the land, an established payment cap, or an amount offered by the landowner. In addition to paying for the easement, USDA pays 100% of the costs of restoring the wetland. <u>30-Year Easement</u> - conservation easement lasting 30 years. Easement payments are 75% of what would be paid for a permanent easement. USDA also pays 75% of restoration costs. <u>Restoration Cost-Share Agreement</u> - an agreement, generally for a minimum of 10 years in duration, to re-establish degraded or lost wetland habitat. USDA pays 75% of the cost of the restoration activity; does not place an easement on the property; the landowner provides the restoration site without reimbursement.
Areas of concern:	Water quality and biodiversity.
water, soil, air, biodiversity grain and hog production	

Note: *Wetlands Memorandum of Agreement:* The Natural Resources Conservation Service (NRCS) and the US Department of Agriculture signed an agreement to protect wetlands in 1996. This Agreement allowed NRCS to begin immediately to provide wetland determinations on privately owned rangeland and pastureland at the request of the owner or operator. Wetland determinations will also be made on tree farms that are part of agricultural operations.

2. Environmental Quality Incentives Program (EQIP)

Government Department	US Department of Agriculture
Title	<i>Environmental Quality Incentives Program (EQIP)</i>
Enactment Date	1996
Keywords	livestock, soil erosion, water quality, conservation
Primary Objective	To provide incentives for crop and livestock producers to make environmental and conservation improvements on farmland.
Targeted Issues	Environmental planning at farm level.
Description and Operational Guidelines	Voluntary program administered by NRCS and FSA. Federal but convened through local districts. combines functions of previous Agricultural Conservation Program, Water Quality Incentives Program, Great Plains Conservation Program and Colorado River Basin Control Program. Provides technical, financial, and educational assistance primarily in designated priority areas; half is targeted to livestock-related natural resource concerns and the remainder to other significant conservation priorities. Offers financial, educational, and technical help to install or implement structural, vegetative, and management practices called for in 5 to 10-year contracts for most agricultural land uses. Targets areas where natural resource problems already exist. Operation: a local work group identifies program priorities by completing a natural resource needs assessment and, based on that assessment, develops proposals for priority areas. Priority area proposals are submitted to the NRCS State Conservationist, who selects those areas within the state based on the recommendations from the State Technical Committee; once a specific area has been identified the producer/owner with help from the NCRS, FSA, CSREES etc. develop a site-specific conservation plan. 5-10 year contracts are offered to provide incentive payments (for up to 3 years) and cost sharing (up to 75%) to carry out the conservation plan; all applications are ranked based on cost-benefit calculations (environmental benefits versus cost of implementation). Eligible land: cropland, rangeland, pasture, forestland and other farm or ranch land with the exception that "large" livestock operations (which is defined at a state level through a public rule-making process) are not eligible for animal waste management facilities.
Areas of concern: water, soil, air, biodiversity grain and hog production	Priority areas are those concerning soil erosion, water quality and quantity, wildlife habitat, wetlands, and forest and grazing lands water management, and wildlife habitat management.

3. Federal Water Pollution Control Act or Clean Water Act

Government Department	EPA but states play a key role in administration
Title	<i>Federal Water Pollution Control or Clean Water Act</i>
Enactment Date	passed in 1972 and amended in 1987
Primary Objective	To increase water quality (including ground and drinking) by limiting pollution discharges
Targeted Issues	Reduce water pollution from agricultural production.
Description and Operational Guidelines	The relevance to agriculture is that the Clean Water Act restricts discharge of fertilizers, pesticides and animal wastes, and controls all drainage from agricultural land. Under section 402, operators of concentrated animal feed lots must obtain a National Pollution Discharge Elimination System (NPDES) permit and comply with its terms. "Concentrated" is defined in the regulations. For swine, a concentrated animal feed lot contains in excess of 750 animals over 55 lbs. A concentrated feed lot is considered a point-source of pollution Section 202 addresses non-point source pollution (irrigation returns, surface water run-off) by requiring states to develop waste treatment plans for discharges not addressed by permit system. Plans must also have a process for identifying possible sources of groundwater pollution, but practices to control pollution of groundwater are not compulsory. The 1987 amendments created a new State Revolving Funds in each state. States receive Federal grants, add in state funds, and then make low interest loans to communities to finance wastewater treatment and other clean water projects.
Areas of concern: water, soil, air, biodiversity grain and hog production	Practices established through the Act may prevent soil erosion (e.g. contour farming, minimum tillage, installation of grassland waterways). Primary concern is water quality.

Note: This Act is the principal federal law limiting pollution of national navigable waters and calls for the restoration and maintenance of the "chemical, physical, and biological integrity of the nation's waters".

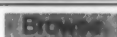
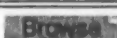
4. Pesticide Environmental Stewardship Program

Government Department	EPA Office of Pesticide Protection with USDA and FDA.
Title	<i>Pesticide Environmental Stewardship Program</i>
Enactment Date	1993
Primary Objectives	Generally aims to reduce pesticide use and risk in agricultural and non-agricultural settings. Encourages alternative approaches to pest control (e.g. biological control). Specific goal by year 2000 is to have 75% of US agricultural acreage adopt integrated pest management programs.
Targeted Issues	Reduce the use of pesticide in agricultural production.
Description and Operational Guidelines	Voluntary program that works through partnership with private organizations; "partners" are pesticide users who agree to develop and implement formal strategies to reduce the use and risk of pesticides. Specifically, partners agree to "tailor their pesticide use to specific sites, crops, and regions of the country" and to report on progress. Associations of pesticide users agree that members will use the safest most effective pest management practices available. "Supporters" are organizations that do not use pesticides but do have significant influence over pest management practices (e.g. food processors, public interest groups). Supporters need to agree to promote programs that facilitate environmental stewardship. Through research, education, and other means, the Federal government will seek to promote and fund the adoption of alternative practices. Partners participate in the identification of needs for research on alternative systems for pest management. Government will integrate the environmental stewardship strategies developed by member organizations into its policies and programs for agriculture and the environment. As funds allow, EPA and USDA provide partners with seed money to help support pest management practices that reduce pesticide use and risk.
Areas of concern: water, soil, air, biodiversity grain and hog production	Aimed at improving all categories.

Note: A program supported with federal funds resulting from the Pollution Prevention Act (see section on Relevant Legislation, Policies and Programs).

Index to Canadian Legal Literature Search Screen



 	
Search Words Anywhere:	
Title:	
Authors:	
Corporate Authors:	
Subjects:	
Series Title:	
Publications:	
Jurisdiction:	
Relevant Statutes:	
Styles of Cause / Cites Cases:	
Related Cases:	
Search & Display Options	
Limit results by Publication Type:	
Publication Date:	From: To: (yyyy/mm/dd)
Return results sorted by:	
Limit number of results to:	
Number of Records per page in results:	

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5. Endangered Species Protection Program

Government Department	FWS and EPA
Title	<i>Endangered Species Protection Program</i>
Enactment Date	1988
Primary Objectives	Protecting endangered and threatened species and restoring them to a secure status in the wild. To provide the best protection for endangered species from the use of pesticides and to minimize the impact of our program on pesticide users.
Targeted Issues	Protection of endangered species.
Description and Operational Guidelines	Important policy of the program is the "ecosystem approach" which says that species habitat must be preserved. Responsibilities of the FWS include the following: 1) listing, reclassifying, and delisting species under the Endangered Species Act, 2) providing biological opinions to Federal agencies on their activities that may affect listed species (particularly to the EPA), 3) overseeing recovery activities for listed species, and 4) providing for the protection of important habitat; providing grants to states to assist with their endangered species conservation efforts. Responsibilities of the EPA include: risk assessment of pesticide effects based on opinions and studies by the FWS; labeling of pesticides if adverse effect is found; issue county bulletins and provides information (compliance is voluntary); recommend alternative pesticides.
Areas of concern: water, soil, air, biodiversity grain and hog production	Directly aimed at preserving biodiversity and indirectly affects water, soil, and air quality through reduced pesticide use.

6. National Organic Program

Government Department	USDA
Title	<i>National Organic Program</i>
Enactment Date	1990
Primary Objective	To establish organic standards and to require and oversee mandatory certification of organic production "The principal guidelines for organic production are to use materials and practices that enhance the ecological balance of natural systems and that integrate the parts of the farming system into an ecological whole" (from Cascadia Farms web page).
Targeted Issues	Standards for producing organic products.
Description and Operational Guidelines	Operates through the National Organic Standards Board (NOSB) which advises the Secretary of Agriculture in setting the standards on which the USDAs National Organic Program will be based. Penalties for mislabeling or false accreditation include fines (up to \$10,000), disbarment from the Organic Program and loss of accreditation. Crop standards: crops must be grown on land which has been free of prohibited substances for three years prior to harvest The Act covers organic agricultural methods and materials including managing soil fertility, when and how manure may be applied to crops, crop rotation, and composting. Compost ingredients recommended by the NOSB include crop residues, crop waste from food processing operations, animal manure's, yard waste from private or municipal sources, or other vegetable by-products. The NOSB recommends prohibiting municipal solid waste compost and sewage sludge compost, and the use of any prohibited material as a compost ingredient. The Act establishes a National List of acceptable and prohibited materials, which includes pest control treatments as well as other agricultural inputs such as fertilizers and seed treatments. NOSB recommends that all agricultural inputs be evaluated as to their long term affect on the environment. Examples of practices and policies: farmers are responsible for establishing adequate buffer zones or barriers to protect against pesticide or fertilizer drift from neighboring conventional farms. NOSB recommends that local, state and federal agencies avoid treating certified organic farms during emergency pest eradication programs, and that they seek alternatives to chemical pest control methods on these; although the NOSB feels strongly that residue standards do not define organic food, it recommends that organic products "shall not contain pesticide residues in excess of the FDA (Federal Drug Administration) action level or 5% of the EPA (Environmental Protection Agency) tolerance. Livestock standards: standards for organic livestock production are meant to assure both an organic product to the consumer and living conditions for farm animals which limit stress and promote good health; address substances used in health care and feeding as well as herd or flock management and housing. All standards and acceptable/unacceptable practices are listed in the National List of Materials.
Areas of concern: water, soil, air, biodiversity grain and hog production	Specifically aimed at preserving all factors ("ecological" or "holistic" approach is part of organic principles).

7. Ruminant Livestock Methane Program

Government Department	Administered by EPA with USDA and local conservation districts.
Title	<i>Ruminant Livestock Methane Program</i>
Enactment Date	1996
Primary Objective	Reduction of methane gas production through profitable management plans (part of the Climate Change Action Plan).
Targeted Issues	Reduce methane emission from agricultural production.
Description and Operational Guidelines	Land-grant universities and USDA researchers are conducting regional assessments to identify improved management practices, technologies, and marketing options that will improve productivity while reducing methane emissions. Extension services will promote the most profitable and appropriate options for reducing methane emissions from beef cows. Local conservation districts will promote cost-effective livestock management plans that will improve animal performance while enhancing forage resources. Outreach activities for this program will include keeping producers informed, integrating results into existing extension programs, evaluating the effectiveness of extension activities, developing management tools for producers to survey their operations and assess productivity options, and conducting hands-on demonstrations.
Areas of concern: water, soil, air, biodiversity grain and hog production	Aimed specifically at air quality by reducing greenhouse gases. Beef only.

Note: A program supported with federal funds resulting from the Pollution Prevention Act (see section on Relevant Legislation, Policies and Programs).

A. Major Directives

1. Directive (78/659/EEC)—Fresh Waters

The Freshwater Directive was enacted on July 18, 1978, with the goal to protect or improve the quality of running or standing fresh waters. The Directive targets the reduction of nitrites, PH, BOD5, non-ionized ammonia, total ammonia, total residual chlorine, total zinc, and dissolved copper.

Member States are to bring into force the laws, regulations and administrative provisions necessary to comply with the directive within two years of notification. Member States are to designate the waters to which the directive applies, and are to set limit values corresponding to certain parameters (waters are classified as either salmonid or cyprinid). All Member States must set values at least the same level as those outlined in the Directive. Member States are to establish programs in order to reduce pollution and to ensure that designated waters conform within five years. Sampling frequency and methods are outlined in the directive.

2. Directive (80/68/EEC)—Groundwater

The Groundwater Directive was enacted on December 17, 1979 and focuses on groundwater pollution by substances. It aims to check or eliminate the pollution, which has already occurred. Member States are to take the necessary steps to prevent the introduction into groundwater of substances listed and to limit the introduction of substances into groundwater.

Member States can authorize the discharge of substances into groundwater, if prior investigations reveal that the groundwater is permanently unsuitable for other uses, especially domestic or agricultural, provided that such discharge does not impede exploitation of ground resources. Member States are to bring into force the laws, regulations and administrative provision necessary to comply with this directive within two years of notification.

This Directive has limited agricultural relevance, given the wide range of substances listed within the directive; however, it does provide an operational framework to monitor groundwater contamination and this is important in regards to the operation and conduct of any industry.

3. Directive (91/414/EEC)—Plant Protection Directive

The Plant Protection Directive was enacted on July 15, 1991 and it controls the placing, marketing and use of plant protection products and active substances in the marketplace. According to this Directive, plant protection products may not be placed on the market by Member States and used in their territory, unless they have been authorized in accordance to this Directive (research and development purposes are an exception). Active substances cannot be placed on the market unless they are classified, packaged and labeled in accordance with Directive 67/548/EEC.

Member States will ensure that a plant protection product is not authorized unless it has minimal influence on the environment. Member States are required to bring the laws, regulations and the administrative provisions necessary to comply with this Directive within two years following notification.

B. Policies and programs

1. Treaty on European Union

Government Department	EU Treaty
Title	<i>Treaty on European Union (Maastricht Treaty)</i>
Enactment Date	1992
Primary Objectives	The Treaty which originally established the European Economic Community (EEC) was amended in order to establish the European Community (EC). Article 3 detailed the activities of the Community, which was to include a policy in the sphere of the environment. Extend the scope of environmental policy by introducing the requirement for majority voting on environmental legislation, and the concept of "sustainable growth", as a principle of Treaty law. It also allowed considerable scope for national action and allowed Member States to implement stronger protective measures, than those agreed for on a Community basis (such measures must be compatible with this Treaty).
Targeted Issues	Article 130r indicated that Union policy should contribute to the pursuit of: preserving, protecting and improving the quality of the environment; protecting human health; prudent and rational utilization of natural resources; and promoting measures at the international level to deal with regional or worldwide environmental problems. Article 130d established the Cohesion Fund to "provide a financial contribution to projects in fields of the environment and trans-European networks in the area of transport infrastructure". Assistance from this fund is subject to three conditions: 1. It goes to Member States whose per capita GNP is less than 90% of the Community average. 2. It is aimed exclusively at projects concerned with the environment and transport. 3. It is applicable only where a national program leading to the fulfillment of the requirements of economic convergence referred to in Article 104c of the Treaty has been drawn up.

¹ The present "Agenda 2000" document proposes that this fund be maintained in its present form. The national coverage enables Community support for the whole territory for the less prosperous Member States to be continued. It is proposed that the Fund should be ECU 3 billion per year.

Description and Operational Guidelines	The European Parliament acting jointly with the Council, the Council and the Commission, and the Commission: makes regulations and issues directives; take decision; and make recommendations or deliver opinions. A regulation is to have general application and it is to be binding in its entirety and directly applicable to Member States. A directive is to be binding, as the result achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods. A decision is to be binding in its entirety upon those to whom it is addressed. Recommendations and opinions shall have no binding force. The Treaty requires Union policy to aim "at a high level of protection", taking into account the diversity of situations in the various regions of the community. It shall be based on the principles that: 1. preventative action should be taken; 2. environmental damage should as a priority be rectified at source; and the polluter should pay. In addition, environmental protection requirements must be integrated into the definition and implementation of other Community policies. In preparing its policy on the environment, the Community shall take account of: available scientific and technical data; environmental conditions in the various regions of the Community; the potential benefits and costs of action or lack of action; and the economic and social development of the Community as a whole, and the balanced development of its region.
Areas of concern: water, soil, air, biodiversity grain and hog production	The Council does not have the authority to adopt waste management measures (a qualified majority is required); it does however, have the required authority in issues involving town and country planning, land use, and measures of a general nature, and management of water resources.

Note The Union has its own automatic sources of revenue. The "own resources" consist of the Value Added Tax (VAT) collected by the Member States as well as a contribution by each Member State, based on its Gross National Product. The budget (\$109 billion in 1995), finances common policies such as agriculture. In addition, more than 25% of the budget is allocated to redistribute wealth from the richer to poorer countries, via the so-called "structural funds". The EU budget represents approximately 1.3% of the combined Gross Domestic Product of the Member States.

2. The Common Agricultural Policy (CAP)—1992 Reforms

Government Department	N/A
Title	<i>Common Agricultural Policy</i>
Enactment Date	1992-CAP reform (CAP is a provision within Treaty of Rome 1958)
Targeted Reform Issues and Problems	The reform process stressed the environmental dimension of agriculture as the largest land user; however, the scale of support still provided through prices and crop specific payments (e.g. silage maize and flax), may discourage farmers from committing themselves to more extensive practices or dedicating land to environmental purposes.
Primary Objective (Original CAP)	to increase productivity; to ensure a fair standard of living for the agricultural community; to stabilize markets; to assure food supplies; and to provide consumers with food at reasonable prices. Note: The original CAP recognized the need to take account of the social structure of agriculture and of the structural and natural disparities between the various agricultural regions, and to effect the appropriate adjustments by degrees.
Description and Operational Guidelines (Reformed CAP)	EU prices in the arable and beef sector were reduced over three years (15% for beef and 29% for cereals). Farmers continued to receive compensatory payments on an historical basis for the reductions in EU support prices. In the case of cereals and other arable crops, compensation payments in general were dependent on the withdrawal of land from production (the "set-aside premium")—which proved to be an effective production control tool. In the case of beef, compensatory premia payments were subject to individual or regional ceilings and are payable on the basis of maximum stocking rates per hectare (strong encouragement to move towards extensive production methods). <i>Accompanying measures</i> were included to cover agri-environment, afforestation and early retirement issues (these schemes have opened up new opportunities for farmers, while providing a response to environmental and structural problems within the EU).
Relevance of the 1992 reform to four areas of concern: water, soil, air, biodiversity grain and hog production	The aim of agri-environmental schemes was to grant aid to farmers for the introduction or maintenance of production techniques, which encouraged the protection of the environment, the landscape and natural resources (more than 160 programs have been approved, based on proposals from Member States and regions of the Union).

Results of the 1992 Reform	Considerable improvement of market balances and a decrease of public stocks in most of the reformed sectors. In the case of cereals, set-aside has helped to keep production under control, while the increased price competition has allowed significant additional quantities to be used on the domestic market, mainly for animal feed. In the beef sector, the market situation evolved favourably and intervention stocks were diminishing rapidly, until the outbreak of the BSE crisis in March 1996. The reform effects on the environment are mixed, with positive elements including: more rational use of fertilizer and pesticides resulting from farm product price decreases; possible environmental benefits of set-aside (if well managed); and incentives for a long-term improvement in territorial distribution of livestock production. Negative effects include: 1. the encouragement given to irrigated crops through the regionalization of direct payments to cereals, oilseeds and protein crops; and 2. the relative advantage given to intensive livestock production through lower feed prices and subsidized silage.
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¹ Eurunion. "The European Union-Agenda 2000". Doc/9/6. July, 1997.

3. Directive (85/337/EEC)—Environmental Impact Assessment¹

Government Department	EU legislation
Title	<i>Assessment of the Effects of Certain Public and Private Projects on the Environment</i>
Enactment Date	June 27, 1985
Primary Objective	Harmonization of environmental assessment and providing environmental information.
Targeted Issues	Public and private projects which are likely to have significant effects on the environment (note that assessment is a fundamental instrument of environmental policy as defined in Article 130r of the Treaty of Rome and of the Fifth Community Program of policy and action related to the environment and sustainable development).

¹ Amendments were made through Directive 97/11/EC March 3, 1997. Appropriate revisions to original text and references have been made on the basis of this directive.

Description and Operational Guidelines	Directive does not apply to projects serving national defense purposes. Member States are not to provide consent to projects which are likely to have significant effects on the environment, by virtue of their size, nature, or location, until an assessment is completed. The environmental impact assessment (EIA) will identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect effects of a project on the following: (1) human beings, fauna and flora, (2) soil, water, air, climate and the landscape, (3) material assets and the cultural heritage, and (4) the interaction between the above factors. Projects within Annex 1 classification shall be subject to an assessment (e.g. large capital-intensive projects, plus <u>agricultural projects</u> involving the intensive production of poultry (85,000 broilers, 65,000 hens), or pigs (3,000 production pigs-over 30 kg or 900 sows). Projects within Annex 2 classification shall be subject to an assessment when Member States shall determine through: (1) case-by-case examination, or (2) thresholds or criteria set by the Member State, and these include <u>agricultural projects</u> such as: - intensive livestock operations; - restructuring of rural land holdings; - projects for the use of uncultivated land or semi-natural areas for intensive agricultural purposes; • water management (including irrigation and land drainage; and initial afforestation, and deforestation for the purpose of conversion to another type of land use, and food industry projects, including manufacturing, packing, canning, slaughtering activities. The provisions of this directive shall not affect the obligation on the competent authorities to respect the limitations imposed by national regulations and administrative provisions and accepted legal practices. Member States and the Commission shall exchange information on the experience gained in applying this directive, including thresholds established for the selection of projects. Member States shall take the measures necessary to comply with this directive within three years of its notification. The provisions of this directive shall not affect the right of Member States to establish stricter rules regarding the scope and procedure when assessing environmental effects. Selection criteria for Annex 2 projects specified in Annex 3. EIA information requirements specified in Annex 4
Areas of concern: water, soil, air, biodiversity grain and hog production	Intensive hog and poultry operations were specified as "Annex 1" projects in the 1997 amendments, which implies that EIAs are mandatory in all Member States and as such, these two livestock sectors are under considerable more scrutiny in all Member States (previous Annex 2 thresholds and criteria no longer apply).

4. Directive (91/676/EEC)—Nitrates

Government Department	EU Legislation
Title	<i>Nitrates From Agricultural Sources</i>
Enactment Date	December 12, 1991
Primary Objective	The reduction of water pollution caused or induced by nitrates from agricultural sources and the prevention of further such pollution. The aim is to provide a general level of protection against pollution, for all waters.
Targeted Issues	Storage and application of all nitrogen compounds and land management practices, including special protection to certain zones, which drain waters vulnerable to pollution.
Description and Operational Guidelines	Committee to be established to assist the Commission related to implementation of Directive. Member States to identify vulnerable zones and to establish and action programs, which include measures to limit land application of all nitrogen-containing fertilizers and to set limits for manure application (waters are to be monitored to ensure measures are effective). Action programs shall be implemented within four years of their establishment and shall consist of specific mandatory measures. Member States to identify waters affected by pollution, and waters which could be affected by pollution if action is not taken. Member States to establish a code or codes of good agricultural practices (within two years), to be implemented by farmers on a voluntary basis, and establish training and information programs for farmers, which promote the application of good agricultural practice. Member States shall establish and implement suitable monitoring programs to assess the effectiveness of action programs (nitrate content of both surface and groundwater is to be monitored at selected measuring points, which make it possible to establish the extent of nitrate pollution in the waters from agricultural sources). Member States shall submit a report to the Commission which contains the prescribe information (Annex V). Member States shall review and if necessary, revise their programs at least every four years. Member States shall bring into force laws, regulations and administrative provisions within two years of the directive. Commission shall submit a report to the Council by January 1, 1998, regarding appropriate proposals for the revision of the directive.

Areas of concern: water, soil, air, biodiversity grain and hog production	Surface water of concern include those intended for the abstraction of drinking water, where the concentration of nitrates exceeds that established in Directive 75/440/EEC. Groundwater of concern contain, or could contain, more than 50 mg/l of nitrates. Other waters of importance include those found to be eutrophic, or may become eutrophic in the future. Good agricultural practices will ensure that for each farm, or livestock unit, the amount of livestock manure applied to the land each year, including that by the animals themselves, shall not exceed that containing 210 kg of nitrogen (during first four year program), and 170 kg of nitrogen thereafter, or by 1999 (different amounts can be specified by Member States following notification to the Commission, and if justified on objective criteria, such as longer growing season, crops with high nitrogen intake, high net precipitation rates in vulnerable zones, and soils with exceptionally high denitrification capacity)
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Note: Pollution is common in the northern parts of the EU, but problems also occur in some areas of the southern Member States. In a European perspective, concern focuses primarily on nitrate levels in ground water, and secondly on the eutrophication of surface and coastal waters. National nitrate policies in the northern EC countries were mainly established during the late 1980s; however, the EC policy against nitrate pollution from agricultural sources is primarily based on the above EC nitrate directive. The sequence established by this directive included the following:

identification of Nitrate Vulnerable Zones before the end of 1993;

establishment of a code of good agricultural practice before the end of 1993;

formulation of a national action program before the end of 1995 (which must be implemented before the end of 1999); and

establish a monitoring program and assess the effectiveness of the program (every four years).

Compliance with the manure application limit (170 kg of nitrogen/ha by 1999), will be troublesome in a number of regions with intensive animal production, namely the Netherlands, the Flemish Region in Belgium, Bretagne in France, and some regions in Germany. In the case of Denmark, the impact of the directive will be limited, since existing national regulations fulfill most EC requirements. The overall EC nitrate policy, as well as that of the individual Member States, is based on a command-and-control approach, and farmers must meet fixed standards set by the authorities. Existing and planned regulations emphasize the manure problem. However, the national regulations vary substantially in their degree of elaboration. Economic measures that provide autonomous incentives to regulate farming practice (in this case pollution), have not been used in the general policy (e.g. Pigouvian taxes).

Source: Soren Rude and Boie S. Frederiksen, "National and EC Nitrate Policies-Agricultural Aspects for 7 EC

Countries". Report No. 77. 1994.

5. Regulation (EEC No. 2078/92)—Agricultural Production Methods

Government Department	EU legislation
Title	<i>Agricultural Production Methods Compatible with the Requirements of the Protection of the Environment and the Maintenance of the Countryside</i>
Enactment Date	June 30, 1992
Primary Objective	The reduction of agricultural pollution and changes in a number of sectors to meet market requirements, through the encouragement of less intensive production methods. The focus was on agricultural production methods compatible with the requirements of environmental protection and the maintenance of the countryside.
Targeted Issues	Four broad issues include: - the reduction of the polluting effects of agriculture; - environmentally favorable extensification of crop and livestock production; - the use of land in ways compatible with the protection and improvement of the environment; and - the upkeep of abandoned farmland and woodlands where necessary for environmental reasons.
Description and Operational Guidelines	Farmers agree to undertake efforts to maintain or improve the environment through low intensity farming systems, landscape programs, land set-aside and maintenance of abandoned land, and training and demonstration projects. Farmers are to be compensated for any income loss caused by the reduction in output, and/or increases in costs. Member States to introduce codes of good farming practice compatible with environmental protection. Given the diversity of the environment and conditions, zonal programs can be implemented for a minimum of five years—which allowed for flexibility in relation to specific regional characteristics.
Areas of concern: water, soil, air, biodiversity grain and hog production	None of the measures are compulsory for farmers, although implementation of the programs is obligatory at the level of Member States (commitments range from five to 20 years, in the case of land set-aside initiatives). Aid scheme to encourage substantial reductions in the use of fertilizers and plant protection products (part financed by the Guarantee Section of the European Agricultural Guidance and Guarantee Fund—EAGGF). Member States may establish a general regulatory framework providing for the horizontal application of one or more of the aids (Article 2), and where appropriate, supported by Zonal programs.

Note: In many parts of the EU, the agri-environmental programs introduced under Regulation 2078/92 marked the first comprehensive attempt to provide support for farmers in their role as guardians of the countryside. Therefore, the introduction of the agri-environmental regulation, covering potentially all regions and all sectors of production, was a significant step in the direction of sustainable and environmentally-beneficial agriculture. Based on early results, many farmers appear to prefer to stay with familiar intensive systems for the following reasons:

the level of assistance (the premia), may be insufficient;

farmers may be reluctant to bind themselves into contracts for five years; and

a greater effort is needed to raise the awareness of farmers.

Source: Reinhard Priebe, EEC Brussels. "European Union: The European Union's Agri-Environment Regulation (EEC) 2078/92—Framework".

**6 (a). Fifth Community Action Program on the Environment 1992-000
(Towards Sustainability)**

Government Department	EU Program
Title	<i>Fifth Community Action Program on the Environment 1992-2000: Towards Sustainability</i>
Enactment Date	Adopted by the European Commission March 18, 1992
Primary Objective	Longer term objectives (next 10 years), with a focus on a global approach. The program introduces economic or market-based instruments to change environmentally-damaging behaviour, integrate environmental considerations into other policy areas, and to develop partnerships with shared responsibilities between government, business and the general public. The features of sustainability include: maintaining the overall quality of life; maintaining continuing access to natural resources; avoiding environmental damage; and meeting the needs of the present, without compromising the ability of future generations to meet their own needs.
Targeted Issues	Five key sectors were targeted by the program because of their environmental impact on: industry, tourism, transport, energy, agriculture.
Description and Operational Guidelines	The integration of the environment dimension in all major policy areas is a key factor. Only through the replacement of the command-and-control approach, with shared responsibility between the various sectors, can commitment to agreed measures be achieved. Wide range of instruments including: Legislation to set environmental standards; Economic instruments to encourage environmentally friendly products and processes; Horizontal support measures (information, education and research); and Financial support measures. The program provided for a review to be undertaken prior to the end of 1995.
Areas of concern: water, soil, air, biodiversity grain and hog production	In addition to the above five key sectors, the program was to cover seven environmental themes including: 1. climate change 2. acidification and air quality 3. urban environment 4. coastal zones 5. waste management 6. management of water resources 7. the protection of nature and biodiversity. Three risk themes included: industry-related risks (chemicals, biotechnology and animal use) nuclear safety and radiation civil protection and environmental emergencies.

Note: The Fifth Community Action Program was a highly significant policy development, particularly in its emphasis to complement legislation with the use of market-based instruments to change environmentally-damaging behaviour. Many Member States have now introduced environmentally-oriented taxation measures and charges for such things as waste water discharges.

**6 (b). Fifth Community Action Program on the Environment 1992-2000
(Summary of Review Results)**

Date Results Released	January 1996 (Commission presented Progress Report on the implementation of the program)
General Findings	Progress had been made on a number of issues, but a great deal remained to be done to move towards sustainability. The Community should focus on a limited number of key priorities and other issues to support the implementation of the program. A number of priorities were identified where action could be carried out effectively at the Community level, in relation to target sectors.
Agricultural Findings	The further development of links between agricultural market instruments and environmental requirements, pursuant to the process of reform of the Common Agriculture Policy (such measures should include monitoring and reporting obligations). To provide for regular reporting on the pressures and effects on the environment of agricultural practices, such as data on fertilizer and pesticide consumption, consumption and quality of water, land use. To promote extensive production methods, sustainable farming technologies and organic farming products, in close cooperation with the individuals and organizations involved. To further develop an integrated strategy for the sustainable use of pesticides, including more detailed provisions on the distribution and sale of pesticides and restrictions of use, and substitution of the most dangerous pesticides. To further develop comprehensive approaches to rural development, including the monitoring and coordination of the various policy instruments concerned.
Methodology And Sector Findings (Summary)	The Community will develop and apply a broader mix of instruments in order to bring about substantial changes in current trends and practices on sustainable development. To improve the legal framework for environmental policy, by adopting a more coherent and comprehensive approach to specific sectors, by simplifying legislation and administrative procedures, where appropriate, and by giving specific attention to the enforceability of measures adopted. In relation to the management of water resources, particular attention will be given to developing a comprehensive strategy setting out an integrated planning and management approach to ground-water and surface water resources, which will focus on both the quantitative and qualitative aspects, and will ensure a sustainable management of regional European seas. In relation to nature protection and biodiversity, the Community, in the implementation of its other policies, will ensure a full integration of nature protection and biodiversity concerns.

Source: Europa. Consolidated text of (95) 647 and (96) 648.

7. Directive (97/41/EC)—Pesticide Residue¹

Government Department	EU legislation
Title	<i>The Fixing of Maximum Levels for Pesticide Residues in and on, Respectively, Fruit and Vegetables, Cereals, Foodstuffs of Animal Origin, and Certain Products of Plant Origin, Including Fruit and Vegetables</i>
Enactment Date	June 25, 1997
Primary Objective	Directive concerns products intended for human consumption, and in exceptional cases, animal consumption listed under the Common Customs Tariff headings (Annex 1), and in or on which are found the pesticide residues listed (Annex 2).
Targeted Issues	Directive 86/362/EEC is amended to indicate that this Directive applies to products listed in Annex 1, and to these products in dried or processed form, and the composite foods in which they are included.

¹ Amends Directives 76/895/EEC (residues in fruit and vegetables), 86/362/EEC (residues in and on cereals), 86/363/EEC (residues in and on foodstuffs of animal origin), and 90/642/EEC (residues in and on certain products of plant origin, including fruit and vegetables), and makes it necessary for certain provisions in the first three listed Directives to be updated in order to comply with 90/642/EEC. Further, Directive 91/414/EEC of July 15, 1991 (plant protection products), provides for a mandate to the Commission to establish, on the basis of provisional maximum residue level set by a Member States, provisional maximum residue levels applicable throughout the Community.

Description and Operational Guidelines	Member States can temporarily reduce the maximum level specified in Annex 2, with immediate notification to other Member States. The Directive applies to products intended for export to third countries; however, the maximum pesticide residues set by the Directive to not, in general, apply in the case of products treated before export (if the country requires it or the treatment is necessary to protect the products during shipment). Member States shall ensure, at least by check sampling, compliance with the maximum levels. Member States shall introduce arrangements for establishing maximum residue levels, whether permanent or temporary, for products referred to in Article 1 (1), brought into their territories from a Member State or origin, taking into account good <u>agricultural practice</u> in the state of origin, and without prejudice to conditions necessary to protect the health of consumers. By June 30 each year, Member States shall send to the Commission, their forward national monitoring programs for the following calendar year (shall specify the products to be inspected, the number of inspections to be carried out, the pesticide residues to be inspected and the criteria applied in establishing the programs). By September 30 each year, the Commission shall submit to the Standing Committee on Plant Health, a draft recommendation setting out a coordinated Community monitoring program.
Areas of concern: water, soil, air, biodiversity grain and hog production	Amends requirements affecting fruit, vegetables, products of animal origin and livestock feed. Provides an effective framework for harmonizing food quality and safety for products produced in Member States, and for products imported into Member States. Directive and amendments ultimately have an impact on farm production practices, plus handling and processing activities beyond the farm gate including composite foodstuffs.

8. Agenda 2000¹

Government Department	Commission proposal
Title	<i>Agenda 2000</i>
Enactment Date	July 15, 1997 (adopted by the Commission)
Background	The Commission prepared the Agricultural Strategy Paper in 1995 and it has confirmed its policy choices. The reform effects on the environment are mixed, with positive elements (see proposed CAP revisions). Rural policy in the Union still appears as a juxtaposition of agricultural market policy, structural policy and environmental policy, with rather complex instruments and <u>lacking overall coherence</u>. Rural trends in the Union show a sharp decline in the number of farms and the number of people employed in agriculture; at the same time, society is increasingly conscious of the importance of the natural environment, and the environmental effects (positive and negative), of human activity.
Primary Objective	Key strategy document in which the Commission sets out its view on how the European Union should develop its common policies beyond the year 2000.
Targeted Issues	Outlines the expected developments regarding: enlargement of the EU; amendments to the Structural and Cohesion Funds; future reform of the common agricultural policy; and future of the EUs finances.
Description and Operational Guidelines	In relation to rural development, existing accompanying measures financed by the EAGGF, Guarantee Section (agri-environment scheme, afforestation, early retirement), will be supported by the Less Favored Areas (LFA) scheme, including its application in the regions lagging behind in their development (Objective 1 regions); all measures are to be applied horizontally and implemented in a decentralized way. In rural areas eligible under the new Objective 2 (formerly Objectives 5[a] and 5[b]), will be financed by the EAGGF Guarantee Section as accompanying measures; these measures will intervene together with the ERDF, the Social Fund and , where appropriate, the FIFG in the same program within the Objective 2 region.
Areas of concern: water, soil, air, biodiversity grain and hog production	See section related to proposed CAP revisions. Environment is a major challenge for <u>Union enlargement</u> (adoption of the Union's environmental rules and standards is essential, but none of the candidate countries can be expected to comply fully in the near future). • Environmental issues with candidate countries are much more severe than those faced by present Member States (effective compliance in the ten countries would require massive investments). A two phase approach may be required, including: 1. realistic national strategies for gradual and effective alignment; and 2. mobilization of domestic and foreign financial resources, in particular from the private sector.

¹ Europa. "Agenda 2000".

9. The Common Agricultural Policy (CAP)—Summary of Proposed Reforms

Government Department	N/A
Title	<i>Common Agricultural Policy</i>
Enactment Date	No Specific Date (CAP is a provision within the Treaty of Rome)
Background	The Commission is of the opinion that the 1992 CAP reform was highly successful, but it is now time to deepen the reform and to enhance the movement towards world market prices, coupled to direct income aids. Three main challenges exist for the future: - continuation of efforts to improve environment sustainability of agricultural production and reduce the complexity of CAP management; - continuing to adapt EU agriculture to increasingly competitive globalization; and - enlargement of the Union (which could potentially double its farm population and expand its agricultural area by more than 40%) . The Commission has confirmed the policy choices in its Agricultural Strategy Paper (1995) The risks related to a lack of action include: 1. potential new market imbalances; 2. difficulties in future trade rounds (e.g. WTO 1999); 3. lack of action regarding more environmentally-friendly and quality-oriented agriculture; and difficulties related to Union enlargement. In regards to current EU policy, the enlargement of the Union (see Agenda 2000) will have the most impact on CAP. The logical conclusion of the 1992 reform process must fully recognize that agricultural policy "cannot lead a life apart from consumer policy and environmental policy, or concerns such as animal welfare" and conservation of the country-side falls within the scope of an environment-oriented agricultural policy.

¹ Europa. "The New CAP".

² Franz Fischler, EU Commissioner for Agriculture and Rural Development. Extracts from 1997 speeches.

Primary Objectives (CAP Reform)	Build upon the reform process started in 1992 (see CAP section). Improve the competitiveness of Union agriculture on both domestic and external markets (greater market orientation). Food safety and food quality. Fair standard of living for the agricultural community. Further integration of environmental goals into CAP and the development of the role farmers can play in terms of management of natural resources and landscape conservation. Promotion of sustainable agriculture. Creation of alternative job and income opportunities for farmers and their families. Simplification of Union legislation. Growing concern related to "environmental friendliness of production methods" and animal welfare. • Agricultural and rural policies have to contribute to <i>improved economic cohesion</i> within the Union.
Targeted Issues	Crops sector (cereals, oilseeds and protein crops) could involve among other changes, the fixing the cereal intervention price in one step (ECU 95.35/t down from ECU 119.19/t), and elimination of silage cereal support. Beef including supply control measures to address the effects of the BSE crisis, with a cyclical downsizing of beef production until 2000 (gradual establishment of an effective market support at ECU 1,950/t (down from ECU 2780/t). The dairy approach may be cautious and involve extending the quota regime up to 2006, simplification of market organizations, decreasing support levels (up to 10% over effective period), and introducing a new dairy cow payment of ECU 145/year. The Commission intends to propose the introduction of an individual ceiling covering all direct income payments granted under the market organizations. In addition, while excluding any re-nationalization, Member States would be allowed to introduce differentiation criteria in accordance with jointly agreed rules.
Description and Operational Guidelines	The Commission confirms the policy choice expressed in the "Agricultural Strategy Paper" (1995) and proposes a deepening and extension of the 1992 reforms, through further shifts from price supports, to direct payments and the development of a coherent rural policy to accompany this process. Targeted agri-environmental measures should be reinforced and encouraged through increased budgetary resources, and where necessary, higher co-financing rates. • In future years, a prominent role will be given to agri-environmental instruments to support a sustainable development of rural areas and respond to society's increasing demand for environmental services (the measures aimed at maintaining and enhancing the quality of the environment shall be reinforced and extended). With respect to better integration of environment into the Common Market Organization, the Commission will make a proposal enabling Member States to make direct payment conditional in respect to environmental provision.

Areas of concern: water, soil, air, biodiversity grain and hog production	Environment is a major challenge for Union enlargement (see Agenda 2000). With respect to agri-environment measures, increased support is recommended for activities which call for an extra effort by farmers, such as organic farming, maintenance of semi-natural habitats, traditional orchards or hedgerows, continuation of alpine cattle keeping, and upkeep of wetlands. A high level of commitment is also needed where actions result in a significant loss of yield (e.g. buffer strips). With respect to the enlargement of the Union and agriculture, aid rather than direct CAP support is envisaged during the transition periods which will be established; however, CAP integration within the crop sector is expected to have relatively few problems in contrast to that for the beef sector (adjustment pressure on the Central European food industry is expected to be large).
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Denmark

1. Environmental Protection Act and the Guidelines to Reduce Nutrient Leaching from Agricultural Land

Government Department	Environmental Protection Agency (EPA)
Title	<i>Environmental Protection Act</i> <i>Guidelines to Reduce Nutrient Leaching</i>
Enactment Date	1973, updated 1991 for the Act 1985-86 guidelines were introduced
Primary Objective	Creation of the Environmental Protection Agency (EPA). Reduce pollution.
Targeted Issues	Reduce pollution resulting from nutrient leaching.

Description and Operational Guidelines	Industries were required to adopt best available technologies in their attempts to reduce pollution. Guidelines to reduce nutrient leaching (particularly N) from agricultural land were introduced in 1985-86 and included: requirements for sufficient manure slurry storage capacity to enable producers to apply when leaching is minimized; and other rules applying to livestock farms are stipulated by the Ministry of Environment and the Ministry of Agriculture and Fisheries include: <u>Storage capacity</u>: Farms must have sufficient capacity to store their manure slurry as long as is necessary to comply with their fertilization strategy and the rules governing application of fertilizer; normally 6-9 months by 1996. For pig farms with more than 60 LU, a 1000m³ manure slurry storage tank is required (approximate cost DKr 250,000) to store 9 months of slurry. Subsidies are available for 25-40% of the costs <u>Sealed manure heaps</u>: Farmers producing solid manure must store the manure on an impermeable base. <u>A reasonable relationship between manure production and area of the adjoining land</u>: not more than 2 LU per hectare for cattle farms and 1.7 LU per hectare for pig farms. However, farmers can enter into written agreements with other farmers to use their land. <u>Fertilizer application requirements</u>: Animal fertilizer can only be applied at certain times of the year when there is vegetation in the fields to use the nutrients and therefore, the least potential for leaching. <u>Green cover</u>: At least 65% of the farm has to be maintained with winter crops to take up nutrients in the winter. <u>Fertilization strategy and fertilization budgets</u>: Farmers are required to draw up fertilization strategies twice a year based on specific figures for percentage utilization. For example, for pig manure slurry, the farmer must base his 1997 strategy on the assumption that 50% of the N in the manure will be utilized by plants and reduce his consumption of commercial fertilizer accordingly. In addition, authorities can also conduct spot checks for compliance.
R e l e v a n t Comments/Assessments	By 1990, leaching from agriculture was essentially unchanged and the Ministry of Agriculture and Fisheries drew up a plan for "Sustainable Agriculture". The goal of 50% reduction in N loading was maintained, but the time frame was extended to the year 2000. The measures were essentially similar to those outlined in the 1985-1986 guidelines, with the addition of set-asides of farm land.
Areas of concern: water, soil, air, biodiversity grain and hog production	Impacts on water and soil quality on agricultural land. Implication for hog and other livestock production.

Note: The Danish Agricultural Properties Act of 1983 adds further requirements to the owners of livestock farms; farmers with large livestock herds must own a greater part of the necessary land themselves (rather than having written agreements with neighbors). For example, farmers with 251-500 LU would have to own 75% of the necessary land. In future, farms will be limited to 500 LU, and farmers with 500 LU will be required to own all of the necessary land.

More recent measures include rules on the minimum distance between animal housing and neighbors. The minimum distance to neighboring houses is 50 m for farms with more than 15 LU of 300 m for farms with 120-150 LU.

2. Action Plan on the Aquatic Environment

Government Department	
Title	<i>Action Plan on the Aquatic Environment</i>
Enactment Date	1987
Primary Objective	To eliminate run-off from storage of animal manure and silage and to reduce agricultural related nitrogen (N) leaching by 50%.
Targeted Issues	Reduce nitrogen and phosphorous discharges
Description and Operational Guidelines	Key components of the Plan include: an end to run-off from storage of liquid and solid manure and silage; regulations requiring adequate storage capacity for animal manure before 1993; requirement for environmental approval for large-scale livestock production; ban on spreading manure on frozen ground and bare soil; restrictions on maximum amount of manure applied per hectare; compulsory fertilizer management plans; maximum time limit of 12 hours for working liquid manure into the soil after spreading; land use regulations requiring autumn crop cover to take up N after harvesting; and programs to support extensification and afforestation of environmentally sensitive land.
Areas of concern:	Primarily water quality.
water, soil, air, biodiversity grain and hog production	

Note: Most of these components were implemented under the Environmental Protection Act. Dubgaard (1991) comments that the Action plan will require investments amounting to 12 billion DKK; including facilities for municipal waste treatment as well as N related measures in agriculture and other sectors. Farmers are estimated to have invested 2 billion DKK building storage facilities by 1990, or an average of 140,000 DKK per farm. Farmers can get a 30% subsidy for the costs of upgrading their manure storage facilities.

3. Environmental Impact Assessments: EC's EIA Directive (85/337)

Government Department	Environmental Protection Agency
Title	<i>Environmental Impact Assessments (EIA)</i>
Enactment Date	New set of EIA rules was introduced in Denmark in 1994, in accordance with the European Union's directive on EIA.
Primary Objective	Harmonization of environmental assessment and providing environmental information.
Targeted Issues	Public and private projects which are likely to have significant effects on the environment.
Description and Operational Guidelines	Under the new rules, pig and poultry farms containing 250 or more livestock units are required to undergo an environmental impact assessment. Approximately 50-100 cases are expected each year. In general, five elements are assessed in determining if an EIA is necessary. the requirement for a local plan under the town and country planning legislation; exceeding guide levels for noise are exceeded; exceeding guide levels for air pollution are exceeded; water quality markedly deteriorates at waste water outfalls; and there is a serious risk of groundwater pollution.
Areas of concern: water, soil, air, biodiversity grain and hog production	Impacts on all four areas of concern. Implications for hog and other livestock production.

Netherlands

1. The National Environmental Policy Plan

Government Department	
Title	<i>The National Environmental Policy Plan (NEPP2)</i>
Enactment Date	1989, last update 1994
Primary Objective	Restore the Dutch environment within 25 years, or one generation. Define a set of principles towards achieving sustainable development
Targeted Issues	Sustainable development in general.
Description and Operational Guidelines	Major principles incorporated into Dutch environmental policy through the NEPP include: - intergenerational equity; - the precautionary principle; - the standstill principle; - abatement at source; - the polluter pays principle; - use of the best applicable technology to control pollution and other environmental harms; - prevention of all unnecessary waste; - isolation, management, and control of wastes that cannot be processed; - internalization; - integrated life cycle management; and - environmental space. Details of the principles and NEPP2 is in Appendix A. Divides environmental problems into eight subsets or themes (climate change, acidification, eutrophication, dispersion of toxic, waste disposal, local nuisance, groundwater depletion, and squandering of resources). Each theme is affected by one or more target group which may be causing pollution and the government works cooperatively with the target groups to eliminate their harmful impacts.
Areas of concern: water, soil, air, biodiversity grain and hog production	Impacts water and soil, as agriculture is a major source of acidification, and eutrophication. It is also a major source of groundwater depletion.

2. Policy Document on Manure and Ammonia

Government Department	
Title	<i>Policy Document on Manure and Ammonia</i>
Enactment Date	1995 and 1996
Primary Objective	Maximum levels of fertilizer application per hectare were established and measures to reduce emissions of ammonia introduced. Timetables for meeting goals over the next 15-20 years were also introduced.
Targeted Issues	Balancing fertilisation where the nutrients added to soil is equivalent to those taken out by cropping.
Description and Operational Guidelines	Major areas covered in the 1996 policy to be implemented before the year 2000 include: <u>Minerals Accounting</u>: a system for accounting for all inputs and outputs of minerals on the farm. If the losses exceed the standards for phosphate and nitrogen set for that year, the surplus is subject to a fine. Fines are 5 guilders per kg phosphate/ha over the surplus for the first 10 kg, and 20 guilders for additional surplus. The system is to enter into force on January 1, 1998. After 1998, farms with more than 2.5 Livestock Unit (LU) stocking rates must report their mineral losses and by 2002, farms with more than 1.5 LU must begin reporting.¹¹ <u>Use and Loss Standards</u>: Use rates for manure application on grasslands were lowered from 150 to 135 kg phosphate per hectare in 1996. In 1998, after mineral accounting has been implemented, the loss standard will be lowered to 40 kg/ha phosphorous and eventually to 20 kg/ha by 2008-2010. For Nitrogen, the loss standard for grassland will be 300 kg/ha in 1998 and 180 kg/ha in 2008-2010. <u>Encouragement and Restructuring</u>: A restructuring fund will be established to aid pig producers in areas where production is concentrates. Part of the fund may be used to take manure production rights via tenders out of the market or to reduce the manure surplus through restructuring. The hog production sector is expected to have the most trouble in meeting targets for manure production. <u>The policy on ammonia</u> is directed towards emission reductions. Farmers with stocking densities over 2LU will be obliged to construct low emission housing in 1998. <u>The effects of the policy measures</u> will be monitored for amounts of manure produced, the development of different solutions for manure surpluses and the results reported annually.
Areas of concern: water, soil, air, biodiversity grain and hog production	Water and soil.

¹¹ The issue of eutrophication from agricultural operations has been addressed in legislation since the 1980's. In 1987, the Act on Manure's and Fertilizers came into force that included a ban on the

expansion of livestock, manure quotas and with restrictions on switching from one type of livestock to another. This early legislation focused on stabilization of manure production and restraint and was therefore designed 'not to make the problem any worse'. Solutions were expected in the form of changes to livestock feeding, manure distribution and processing practices to be identified by the livestock industry. In the 1987 Act, an upper limit for phosphate production by agricultural holdings was established thereby creating manure productions rights or quotas. Limits on quantities of animal manure that could be spread on fields were introduced. However, these limits were criticized as being so generous that the problem was not addressed. Farms with stocking densities below the trigger amounts for mineral accounting will still be expected to follow a basic set of measures applying to all farms.

France

1. Law on Classified Facilities

<i>Government Department</i>	
Title	<i>Law on Classified Facilities</i>
Enactment Date	1976
Primary Objective	Provides for integrated pollution management (air, waste, water) both for facilities whose actions must simply be reported and for those with potentially significant impact on the environment which require authorization.
Targeted Issues	Reduce water, air and waste pollution.
Description and Operational Guidelines	Facilities are required to adopt, or meet standards associated with the best available technologies. The Law is based on the <u>polluter pays principle</u> and takes into account all risks, pollutants or nuisances that a given facility might cause. France has 600,000 classified facilities, of which 68,000 require authorization. These facilities are monitored by about 1,000 inspectors from the DRIREs (Regional Directorate of Industry, Research and the Environment) except for 23,000 livestock operations and slaughter houses which are inspected by veterinary authorities.
Areas of concern: water, soil, air, biodiversity grain and hog production	Primarily aimed at reducing water pollution. Will have significant impact on hog producers.

2. The National Environmental Plan

Government Department	Ministry of the Environment
Title	<i>The National Environmental Plan</i>
Enactment Date	1990
Primary Objective	Reorganization of environmental institutions. Increases in funding and in the use of economic instruments. Qualitative aspects: landscape and product quality.
Targeted Issues	Reduce water pollution.
Description and Operational Guidelines	More rigorous implementation of environmental policy and legislation. Increase public involvement and encouragement of environmental partnerships. Inclusion of environment in international cooperation and sustainable development efforts. 10 year Objectives (1990-2000): bring all public water supplies into line with EU Directives; reduce domestic wastewater by 60%; reduce nitrate and phosphate pollution in vulnerable areas by 80%; improve the safety of the drinking water supply; establish incentives to eliminate toxic effluents; and double the pace at which flood risk plans are produced.
Areas of concern: water, soil, air, biodiversity grain and hog production	Primarily aimed at reducing water pollution. Will have significant impact on hog producers.

Australia

1. Murray-Darling Basin Initiative (MDBI)

Government Department	Murray-Darling Basin Commission
Title	<i>Murray-Darling Basin Initiative</i>
Enactment Date	1985
Primary Objectives	Partnership between the Commonwealth and the four main agricultural states. Directed towards equitable, efficient and sustainable use of the land, water and other natural resources of the Murray-Darling Basin. This Basin is the primary agricultural production area of Australia (40% of Australia's total agricultural value).
Targeted Issues	Reduce land degradation and conservation of water and sensitive ecosystems.
Description and Operational Guidelines	Under the MDBI, governments and communities work together to implement resource management strategies which seek to achieve: - improve and maintain water quality for all beneficial uses—agricultural, environmental, urban, industrial and recreational; - control of existing land degradation, appreciation of further land degradation and where possible, rehabilitation of land resources; and - conservation of the natural environment of the Basin and preservation of sensitive ecosystems. MDBI consists of two main programs: 1. <i>Basin Sustainability Program</i>—provides direction and funding to projects aimed at over-coming knowledge gaps and to partnerships for regional and issue-based resource management plans. 2. Two subprograms are specific to agriculture. The Drainage Program supports communities and governments in works aimed at minimizing land degradation arising from salinity and water logging problems from agriculture. The Irrigation Management Strategy aims to achieve a sustainable and self-sufficient irrigation industry in the southern Basin by 2020. <i>Water Business Program</i>—consists of river management and flow regulation and the associated physical and biological environment. Interim cap placed on diversions following a 1995 water resource audit.
Areas of concern: water, soil, air, biodiversity grain and hog production	Water, soil, biodiversity. Impacts on grain and hog production.

2. National Strategy for Ecologically Sustainable Development (ESD Strategy)

Government Department	Environment Australia
Title	<i>National Strategy for Ecologically Sustainable Development (ESD Strategy)</i>
Enactment Date	1992
Primary Objective	To enhance individual and community well-being and welfare by undertaking economic development that safeguards the welfare of future generations. To provide for equity within and between generations. To protect biological diversity and maintain essential ecological processes and life-support systems.
Targeted Issues	Development that improves the total quality of life (current and future) while maintaining the ecological processes.
Description and Operational Guidelines	Key principles for this Strategy include: a decision-making process that integrates both long and short-term economic, environmental, social and equity considerations; recognize the global dimension of environmental impacts of actions and policies; develop a strong, growing and diversified economy that enhances the capacity for environmental protection; maintain and enhance international competitiveness in an environmentally sound manner; adopt cost effective and flexible policy instruments, such as improved valuation, pricing and incentive mechanisms; provide for broad community involvement on issues which affect them; and prevent environmental degradation despite lack of scientific certainty for areas threatened with serious or irreversible environmental damages.
Areas of concern: water, soil, air, biodiversity grain and hog production	Specific strategy for protecting biodiversity, but impacts on air, soil and water.

3. Greenhouse 21C—Expanding the National Greenhouse Response Strategy

Government Department	
Title	<i>Greenhouse 21C: A Plan of Action for A Sustainable Future</i>
Enactment Date	Builds upon the 1992 National Greenhouse Response Strategy
Primary Objective	An active partnership between government and industry through cooperative agreements Supports renewable energy through industry development programs Greenhouse gas information network to support action by all sections of society Enhanced cooperation with the States and Territories to address issues relating to greenhouse including land management and energy sector reform Emphasis the government's own operation on environmental best practice Expansion of tree planting programs to further develop greenhouse sinks.
Targeted Issues	Reduction of greenhouse gas emissions from all sources.
Description and Operational Guidelines	Specific to agriculture is Biosphere 21C. Key items in this initiative include: - greater recognition of greenhouse issues in Landcare and forest policies; - expansion of One Billion Trees program; - labor market programs for expanded tree planting; - cooperative action with the States to monitor land clearance; and About 40 % of Australia's net greenhouse gas emissions are estimated to derive from land management and agriculture.
Areas of concern: water, soil, air, biodiversity grain and hog production	Greenhouse gas emissions are associated with energy use, urban activity, land management, and agriculture. Greenhouse gas emissions have an impact on climate change, which could affect the air quality.

4. National Landcare Program (NLP)

Government Department	Primary Industries and Energy
Title	<i>National Landcare Program</i>
Enactment Date	1992
Primary Objective	Enhance the efficient, sustainable and equitable management of the nation's natural resources for the benefit of the overall community.
Targeted Issues	Sustainable management of land, water, plants and animal by landholders.
Description and Operational Guidelines	Replaces programs that have provided support to state and local governments for land conservation and water resource management. Design to encourage integrated approach in managing land, water and vegetation resources. Funding is provided through Commonwealth/ State partnership agreements. Key focus is implementing coordinated projects. Fund on a regional and catchment basis. Three main components: <u>Community component</u> aims to encourage groups to identify and solve soil, water, vegetation management and nature conservation problems. Grants assist groups with planning, education and training, surveying and mapping, demonstration projects and monitoring activities. <u>Community support</u> component provides funding to State/Territory government agencies, local government and non-government organizations to achieve sustainable resource management. Support for landcare groups, education and training project management planning, information, property management, country towns' water management, floodplain management and regional projects. <u>National component</u> focuses on issues the National Government can address in its own right. Funds are provided for project where additional effort is required to achieve national priorities such as better wastewater management. Also provides funding to employ the national landcare facilitator.
Areas of concern: water, soil, air, biodiversity grain and hog production	Most areas of cropland are affected by soil degradation—soil structure decline, waterlogging and salinity, water and wind erosion, soil nutrient balance and soil acidification. Poor soil, climate variability, concentration of agriculture on only 6% of land, loss of biodiversity are key pressures. Major wheat-growing region are southwest Western Australia, South Australia wheatbelt and central New South Wales. Clearing preservation is a key component—land clearing has caused severe soil erosion and loss of biodiversity. The most critical factor in productive soils is the maintenance of cover which NLP is attempting to address.

5. National Heritage Trust

Government Department	Ministry for Primary Industries and Energy (DPIE), and Environment Australia
Title	<i>National Heritage Trust</i>
Enactment Date	1996
Primary Objective	Provides an integrated and long-term approach to the preservation and enhancement of natural resources. Provides support for partnerships between the community, industry and all levels of government to address issues relating to land and water degradation, loss of native vegetation, and improve management of coasts and marine areas.
Targeted Issues	Address environmental issues relating to land management, land and water degradation, and conservation of natural resources.
Description and Operational Guidelines	The government has committed a total of \$1.25 billion over six years to this fund for conservation and natural resource management. In 1997/98, the Trust will provide funding of \$94.8 million for DPIE programs. These funds will be allocated to the a number of programs including: <u>National Landcare Program</u> —\$35 million (total funding for this program will be \$87.4 million; <u>Murray-Darling 2001 Initiative</u> —\$29.5 million to accelerate activities addressing high priority land and water degradation issues (\$163 million over six years; <u>National land and water audit</u> —\$7.45 million in 1997/98 on development of national indicators and inventories (\$37 million over six years); and <u>National weeds Strategy</u> —\$3.08 million (\$24 million over six years) to control weeds that reduce farm productivity, displace native species and contribute to land degradation.
Areas of concern: water, soil, air, biodiversity grain and hog production	Funding provided for these programs are designed to improve water quality, reduce soil and water degradation, and conservation of biodiversity.

Appendix C
Hog and Field Crop Statistics

Total hog numbers by country and selected provinces or state
Exhibit 1
(1992-1996)

(Million Hogs)	1992	1993	1994	1995	1996	Trend During 1992-96 Period
Canada	10.64	10.50	10.99	11.76	11.91	Steady Increase
USA	58.20	57.90	59.99	58.26	56.17	Variable
Australia	2.79	2.74	2.78	2.65	2.66	Minor Variation
Denmark ³	10.34	10.87	10.92	11.08	11.08	Constant
Netherlands	14.16	14.96	14.57	14.40	14.42	Variable
France	12.06	12.56	14.29	14.59	14.80	Steady Increase

Hog Numbers By Province or State (Million)	1992	1996	Trend During 1992-96 Period
Canada:			
• Quebec	2.98	3.37	+13%
• Ontario	3.03	3.21	+6%
• Manitoba	1.40	1.88	+34%
• Alberta	1.85	1.99	+8%
• Saskatchewan	0.87	0.92	+6%
Top Five Total	10.13	11.37	+12%
Top Five % Canada	95%	95%	-
USA:			
• Iowa	14.90	12.20	- 18%
• North Carolina	4.50	9.30	+ 106%
• Minnesota	4.70	4.85	+3%
• Illinois	5.90	4.40	-25%
• Indiana	4.55	3.75	-18%
Top Five Total	34.55	34.50	Constant Overall
Top Five % USA	59%	61%	-

¹ Information for Denmark, France, USA and Australia from FAO Yearbook (various years).

² Statistics Canada (first quarter national and provincial values).

³ Statistics Netherlands, 1997.

⁴ USDA. National Agricultural Statistics Service (NASS). 1997

Exhibit 2
Total area of cereals harvested by country

Canada	20.16	19.41	17.95	18.26	21.13	Recent Increases
USA	65.82	60.34	64.06	59.62	65.11	Variable
Australia	13.31	14.29	12.18	15.29	16.41	Recent Increases
Denmark	1.61	1.45	1.41	1.46	1.58	Minor Variation
Netherlands	0.18	0.18	0.19	0.19	0.20	Constant
France	9.35	8.54	8.15	8.30	8.80	Variable

¹ *FAO Yearbook (various years).*

Appendix D

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Appendix D

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